

80
982
A27
VOLUME 10

SEP 10 '48

W. B. MANNING

NUMBER 6

UNITED STATES DEPARTMENT OF COMMERCE
CHARLES SAWYER, Secretary
WEATHER BUREAU F. W. Reichelderfer, Chief

MONTHLY WEATHER REVIEW

JUNE 1948

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CORRECTION

All stations having copies of SUPPLEMENT 25 of the MONTHLY WEATHER REVIEW should make the following corrections on page 53 to the daily normal mean temperature for Modena, Utah, for June 23.

The temperature should be changed from 60.0° to 66.0°; and the monthly mean value, from 63.3° to 63.5°.

MONTHLY WEATHER REVIEW

Editor, James E. Caskey, Jr.

VOL. 76, No. 6
W. B. No. 1527

JUNE 1948

CLOSED AUGUST 5, 1948
ISSUED SEPTEMBER 15, 1948

METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR JUNE 1948

AEROLOGICAL OBSERVATIONS

[For description of change in Table 1 and charts, see REVIEW, January 1946, p. 6]

TABLE 1.—Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during June 1948

STATIONS AND MEAN SURFACE PRESSURES

Standard pressure surface (mb.)	Albany, N. Y. (1,022.2 mb.)				Albuquerque, N. Mex. (837.0 mb.)				Apalachicola, Fla. (1,015.8 mb.)				Atlanta, Ga. (981.0 mb.)				Big Spring, Tex. (924.2 mb.)				Bismarck, N. Dak. (955.1 mb.)				Boise, Idaho (913.1 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface.....	30	86	16.3	80	30	1,620	24.6	31	30	5	25.7	83	30	300	23.9	71	30	774	28.3	41	30	505	18.1	70	30	868	21.2	55
1,000	30	105	(*)	---	30	25	(*)	---	30	143	25.0	81	30	132	(*)	---	30	107	(*)	---	30	107	(*)	---	30	71	(*)	---
950	30	549	16.4	68	30	495	---	---	30	596	22.9	72	30	585	24.5	61	30	532	---	---	30	552	18.2	65	30	525	---	
900	30	1,002	13.9	69	30	980	---	---	30	1,063	20.1	68	30	1,054	21.4	63	30	1,009	27.7	39	30	1,012	15.8	59	30	1,496	18.1	46
850	30	1,481	10.5	---	30	1,454	---	---	30	1,555	16.8	70	30	1,547	17.6	63	30	1,513	24.2	41	30	1,495	12.3	63	30	1,486	21.5	45
800	30	1,984	7.1	68	30	2,015	22.5	---	30	2,069	13.4	72	30	2,063	13.9	69	30	2,040	20.0	44	30	2,000	8.8	66	30	2,002	14.0	45
750	30	2,514	3.9	68	30	2,517	18.1	33	30	2,612	9.8	69	30	2,606	10.2	62	30	2,596	16.0	44	30	2,537	5.3	65	30	2,541	9.4	53
700	30	3,070	8.8	58	30	3,157	13.2	38	30	3,180	6.4	63	30	3,179	6.8	54	30	3,175	11.8	46	30	3,092	2.2	63	30	3,110	5.0	66
650	30	3,668	-1.6	55	30	3,774	7.9	46	30	3,785	3.0	56	30	3,783	3.1	56	30	3,795	7.0	48	30	3,688	-1.1	60	30	3,714	6.0	69
600	30	4,295	-5.2	55	30	4,428	2.2	55	30	4,429	-1.6	40	30	4,425	-1.7	45	30	4,443	1.8	52	30	4,321	-4.7	53	30	4,348	-3.8	80
550	30	4,978	-9.2	61	30	5,122	-3.4	63	30	5,123	-4.4	44	30	5,118	-4.4	40	30	5,140	-3.0	49	30	5,001	-8.7	52	30	5,029	-8.4	67
500	30	5,705	-13.9	53	30	5,871	-8.8	66	30	5,865	-9.1	40	30	5,861	-9.0	30	30	5,888	-17.6	30	30	5,734	-15.8	46	30	5,762	-13.7	64
450	30	6,506	-19.0	53	30	6,685	-14.4	4	30	6,678	-14.3	30	30	6,654	-14.0	30	30	6,711	-12.5	30	30	6,532	-15.8	48	30	6,558	-19.4	54
400	30	7,366	-24.8	---	30	7,561	-20.6	---	30	7,555	-20.4	---	30	7,554	-20.1	---	30	7,592	-18.6	---	30	7,395	-25.0	---				

TABLE 1.—Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during June 1948—Continued

Standard pressure surface (mb.)	Dodge City, Kans. (922.3 mb.)				El Paso, Tex. (878.7 mb.)				Ely, Nev. (808.0 mb.)				Fort Worth, Tex. (987.2 mb.)				Glasgow, Mont. (939.3 mb.)				Grand Junction, Colo. (850.5 mb.)				Great Falls, Mont. (887.8 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	30	792	22.7	62	29	1,195	29.1	26	30	1,908	17.7	36	30	211	28.4	55	30	648	18.6	65	30	1,474	22.3	32	30	1,128	16.3	70
1,000	30	77	(*)	---	29	24	(*)	---	30	40	(*)	---	30	95	(*)	---	30	104	(*)	---	30	38	(*)	---	30	100	(*)	---
950	30	536	(*)	---	29	497	(*)	---	30	501	(*)	---	30	556	27.2	50	30	550	(*)	---	30	505	(*)	---	30	552	(*)	---
900	30	1,005	23.0	57	29	985	(*)	---	30	973	(*)	---	30	1,029	23.9	53	30	1,014	17.1	57	30	981	(*)	---	30	1,013	(*)	---
850	30	1,502	20.5	55	29	1,489	27.8	26	30	1,469	(*)	---	30	1,527	20.4	56	30	1,498	13.5	59	30	1,479	(*)	---	30	1,498	14.6	63
800	30	2,024	17.3	57	29	2,022	23.6	27	30	1,993	18.3	33	30	2,048	17.0	53	30	2,006	9.7	63	30	2,005	20.2	31	30	2,007	11.0	66
750	30	2,575	13.7	56	29	2,583	18.8	32	30	2,543	13.9	35	30	2,602	14.0	44	30	2,542	6.2	63	30	2,557	15.3	36	30	2,548	7.2	70
700	30	3,149	9.6	55	29	3,167	13.7	39	30	3,118	8.8	41	30	3,174	10.1	42	30	3,101	2.9	64	30	3,136	10.3	42	30	3,107	3.3	72
650	30	3,763	5.0	56	29	3,788	8.1	47	30	3,726	3.7	48	30	3,792	5.9	43	30	3,699	1.5	67	30	3,748	5.0	47	30	3,706	1.6	70
600	30	4,407	3.3	57	29	4,440	2.4	56	30	4,370	1.8	54	30	4,435	1.3	42	30	4,334	4.1	56	30	4,394	1.6	52	28	4,340	4.6	64
550	30	5,100	4.4	55	28	5,134	3.0	57	30	5,054	7.2	57	30	5,132	3.4	41	30	5,018	8.3	54	30	5,083	6.1	53	28	5,025	8.6	57
500	28	5,841	9.6	48	27	5,886	8.2	49	30	5,791	12.5	50	30	5,878	7.8	34	30	5,749	13.0	48	30	5,821	11.5	46	28	5,753	13.6	54
450	28	6,554	14.6	---	27	6,704	13.5	---	29	6,597	18.1	---	30	6,699	12.9	---	29	6,553	18.7	50	30	6,629	16.9	---	28	6,554	19.3	50
400	28	7,529	21.3	---	27	7,583	19.7	---	28	7,460	24.5	---	30	7,579	18.7	---	29	7,413	25.2	---	30	7,494	23.5	---	28	7,410	26.1	---
350	28	8,500	28.4	---	27	8,560	27.0	---	27	8,425	31.6	---	30	8,558	26.6	---	28	8,369	32.6	---	30	8,456	30.8	---	28	8,361	33.6	---
300	28	9,585	36.6	---	27	9,652	35.6	---	27	9,497	39.8	---	29	9,652	35.1	---	28	9,435	41.4	---	30	9,531	39.1	---	27	9,427	42.1	---
250	28	10,824	45.9	---	27	10,894	45.7	---	27	10,718	49.0	---	29	10,897	44.9	---	26	10,639	51.6	---	30	10,756	47.9	---	27	10,633	51.9	---
200	25	12,267	56.1	---	27	12,344	56.6	---	26	12,155	56.0	---	29	12,350	56.2	---	25	12,058	58.3	---	28	12,205	55.8	---	26	12,047	58.8	---
175	22	13,099	61.3	---	27	13,179	62.0	---	24	12,997	58.1	---	28	13,187	61.8	---	22	12,900	56.3	---	26	13,050	58.1	---	25	12,888	58.3	---
150	16	14,040	63.1	---	23	14,120	66.8	---	23	13,963	59.7	---	27	14,133	66.4	---	18	13,880	55.0	---	23	14,015	59.8	---	22	13,855	56.8	---
125	---	---	---	---	11	15,216	70.8	---	22	15,098	60.3	---	19	15,215	70.4	---	14	15,041	55.3	---	22	15,146	61.5	---	20	15,013	57.1	---
100	---	---	---	---	---	---	---	---	15	16,485	62.0	---	12	16,534	71.9	---	8	16,464	55.7	---	16	16,519	62.9	---	17	16,416	58.1	---
80	---	---	---	---	---	---	---	---	10	17,864	61.8	---	---	---	---	---	---	---	---	---	---	---	---	---	11	17,836	58.8	---
60	---	---	---	---	---	---	---	---	5	19,682	58.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
40	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Standard pressure surface (mb.)	Greensboro, N. C. (983.4 mb.)				Hatteras, N. C. (1,014.2 mb.)				Havana, Cuba ¹ (----- mb.)				Honolulu, T. H. (1,014.7 mb.)				Huntington, W. Va. (994.2 mb.)				International Falls, Minn. (973.0 mb.)				Joliet, Ill. (992.5 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	29	273	20.4	83	29	3	23.6	87	---	---	---	---	30	3	27.4	62	30	172	19.5	83	30	360	14.8	73	30	178	17.6	78
1,000	29	128	(*)	---	29	126	23.2	83	---	---	---	---	30	132	25.2	64	30	120	(*)	---	30	126	(*)	---	30	112	(*)	---
950	29	578	21.6	68	29	577	21.2	72	---	---	---	---	30	585	21.3	71	30	569	20.5	69	30	565	16.3	64	30	558	18.6	70
900	29	1,042	19.0	65	29	1,041	18.7	69	---	---	---	---	30	1,047	17.7	75	30	1,030	17.6	67	30	1,021	13.3	65	30	1,017	16.3	68
850	29	1,531	15.4	70	29	1,530	15.4	70	---	---	---	---	30	1,535	14.7	76	30	1,517	14.3	69	30	1,500	10.0	68	30	1,501	13.3	69
800	29	2,043	11.6	74	29	2,042	12.4	67	---	---	---	---	30	2,046	12.5	65	30	2,027	11.1	67	30	2,001	6.6	68	30	2,009	10.4	68
750	29	2,586	8.0	74	29	2,586	9.2	62	---	---	---	---	30	2,594	11.5	37	30	2,569	7.8	70	30	2,533	3.8	60	30	2,549	7.2	67
700	29	3,147	4.9	63	29	3,150	6.0	55	---	---	---	---	30	3,160	9.3	25	30	3,129	4.4	66	30	3,086	1.0	49	30	3,109	4.1	63
650	29	3,751	1.1	64	29	3,757	2.7	53	---	---	---	---	30	3,775	6.2	22	30	3,729	9.6	64	30	3,682	1.9	42	30	3,709	8.8	55
600	29	4,388	2.7	61	28	4,394	9.9	50	---	---	---	---	30	4,422	2.2	---	30	4,368	3.0	63	30	4,312	5.4	39	30	4,348	2.9	56
550	29	5,079	6.4	54	28	5,087	4.9	40	---	---	---	---	30	5,121	2.1	---	29	5,051	6.9	51	30	4,990	9.6	43	30	5,033	6.7	51
500	29	5,812	10.7	45	28	5,828	9.4	41	---	---	---	---	30	5,869	6.9	---	29	5,789	11.2	45	30	5,718	14.2	43	30	5,772	11.1	46
450	28	6,620	16.0	40	28	6,642	14.5	---	---	---	---	---	30	6,692	12.0	---	29	6,597	16.1	39	30	6,515	19.6	44	30	6,581	16.4	44
400	28	7,489	22.1	---	27	7,517	20.6	---	---	---	---	---	30	7,574	18.4	---	29	7,468	22.4	---	30	7,373	25.8	---	30	7,451	22.5	---
350	28	8,457	29.1	---	27	8,491	27.5	---	---	---	---	---	30	8,557	25.7	---	29	8,435	29.6	---	29	8,328	33.0	---	30	8,417	29.8	---
300	28	9,540	37.1	---	26	9,579	35.8	---	---	---	---	---	30	9,654	34.2	---	28	9,517	37.7	---	29	9,393	41.1	---	30	9,496	38.0	---
250	28	10,776	46.1	---	25	10,825	45.2	---	---	---	---	---	30	10,904	43.8	---	28	10,750	46.7	---	29	10,607	50.0	---	28	10,740	47.0	---
200	27	12,234	56.1	---	24	12,285	55.6	---	---	---	---	---	30	12,369	53.9	---	28	12,200	55.4	---	27	12,045	55.6	---	27	12,045	56.9	---
175	26	13,073	60.6	---	22	13,133	61.1	---	---	---	---	---	30	13,216	58.6	---	26	13,037	59.3	---								

TABLE 1.—Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during June 1948—Continued

Standard pressure surface (mb.)	Miami, Fla. (1,015.9 mb.)				Nantucket, Mass. (1,012.2 mb.)				Nashville, Tenn. (993.5 mb.)				New Orleans, La. (1,014.5 mb.)				North Platte, Nebr. (916.3 mb.)				Oakland, Calif. (1,013.7 mb.)				Ogden, Utah (862.3 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	30	4	26.0	82	29	14	13.0	93	28	180	24.5	64	30	2	25.8	80	30	849	19.1	72	30	6	16.2	74	30	1,355	20.7	46
1,000	30	144	25.7	79	29	116	14.2	87	28	122	(*)	—	30	129	25.9	76	30	86	(*)	—	30	121	14.9	76	30	50	(*)	—
950	30	596	22.7	78	29	559	15.9	71	28	574	23.6	61	30	581	23.5	71	30	538	(*)	—	30	565	14.2	71	30	512	(*)	—
900	30	1,065	19.8	74	29	1,011	14.1	66	28	1,043	20.2	64	30	1,051	20.7	69	30	1,004	19.6	67	30	1,012	15.9	51	30	985	(*)	—
850	30	1,557	16.9	70	29	1,491	11.5	65	28	1,534	16.6	70	30	1,543	17.8	64	30	1,495	17.0	65	30	1,497	14.0	44	30	1,479	20.7	40
800	30	2,072	14.1	63	29	1,996	8.7	60	28	2,049	13.0	70	30	2,060	14.8	57	30	2,010	13.6	66	30	2,006	11.5	37	30	2,000	17.1	39
750	30	2,618	11.3	55	29	2,532	6.1	52	28	2,595	9.4	65	30	2,606	11.7	46	30	2,555	10.6	65	30	2,547	8.5	34	30	2,551	12.5	43
700	30	3,189	8.2	52	29	3,090	3.5	50	28	3,159	6.2	56	30	3,178	8.4	42	30	3,123	7.1	65	30	3,108	5.3	31	30	3,119	7.6	48
650	30	3,800	4.7	47	29	3,691	2.2	51	28	3,766	3.0	45	30	3,787	4.7	38	29	3,731	3.0	61	30	3,714	1.6	34	30	3,726	2.7	54
600	30	4,446	1.0	43	29	4,326	-3.2	50	28	4,407	-1.0	44	30	4,433	5	40	29	4,374	-1.3	54	30	4,350	-2.4	36	30	4,367	-2.2	57
550	30	5,141	-3.1	41	28	5,008	-7.3	48	28	5,067	-4.9	37	30	5,127	-3.6	35	29	5,060	-5.8	53	30	5,040	-6.8	34	29	5,053	-7.5	89
500	30	5,888	-7.9	42	27	5,749	-11.8	42	28	5,840	-9.6	43	30	5,873	-8.4	—	29	5,803	-10.6	48	30	5,772	-11.9	—	29	5,790	-12.8	51
450	29	6,708	-13.1	41	26	6,553	-17.0	—	28	6,658	-14.6	43	30	6,691	-13.2	—	29	6,609	-16.2	49	30	6,580	-17.3	—	29	6,593	-18.5	46
400	29	7,588	-18.9	—	26	7,421	-22.8	—	27	7,528	-20.5	—	30	7,571	-19.6	—	29	7,481	-22.6	—	30	7,443	-23.6	—	28	7,458	-24.4	—
350	29	8,568	-26.2	—	25	8,387	-29.4	—	27	8,502	-28.2	—	30	8,550	-26.3	—	29	8,448	-29.7	—	30	8,405	-30.7	—	28	8,416	-32.0	—
300	28	9,668	-34.3	—	25	9,470	-37.1	—	26	9,591	-36.0	—	30	9,645	-34.6	—	29	9,528	-38.0	—	30	9,481	-38.9	—	27	9,484	-40.8	—
250	27	10,917	-44.0	—	25	10,705	-46.0	—	25	10,827	-45.7	—	30	10,892	-44.3	—	29	10,758	-47.7	—	30	10,708	-47.7	—	27	10,699	-50.3	—
200	27	12,377	-55.4	—	24	12,162	-55.5	—	22	12,280	-55.5	—	29	12,352	-55.3	—	28	12,198	-57.2	—	30	12,154	-55.0	—	24	12,126	-56.8	—
175	24	13,216	-61.2	—	23	13,012	-58.2	—	21	13,114	-60.3	—	29	13,192	-60.9	—	27	13,036	-60.3	—	30	13,004	-56.1	—	22	12,970	-57.8	—
150	22	14,162	-66.2	—	22	13,982	-59.2	—	16	14,045	-62.7	—	26	14,142	-65.4	—	26	13,997	-61.5	—	29	13,985	-57.7	—	19	13,941	-58.3	—
125	17	15,267	-70.1	—	18	15,116	-60.1	—	9	15,121	-62.0	—	19	15,245	-69.3	—	23	15,124	-62.1	—	24	15,150	-60.7	—	15	15,078	-58.8	—
100	8	16,560	-69.0	—	14	16,501	-58.8	—	—	—	—	—	16	16,562	-71.3	—	18	16,504	-63.8	—	11	16,522	-61.9	—	6	16,476	-61.5	—
80	—	—	—	—	—	—	—	—	—	—	—	—	10	17,881	-67.3	—	11	17,880	-62.5	—	—	—	—	—	—	—	—	—
60	—	—	—	—	7	17,901	-56.5	—	—	—	—	—	—	—	—	—	5	19,682	-58.2	—	—	—	—	—	—	—	—	

Standard pressure surface (mb.)	Oklahoma City, Okla. (966.8 mb.)				Omaha, Nebr. (976.5 mb.)				Phoenix, Ariz. (968.0 mb.)				Pittsburgh, Pa. (969.4 mb.)				Portland, Maine (1,010.7 mb.)				Rapid City, S. Dak. (902.9 mb.)				St. Cloud, Minn. (976.0 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	30	391	23.9	76	30	308	22.6	64	30	339	31.2	21	30	352	19.5	72	30	20	12.7	86	30	980	15.6	82	30	317	17.4	72
1,000	30	91	(*)	—	30	99	(*)	—	30	45	(*)	—	30	112	(*)	—	30	110	13.7	80	30	98	(*)	—	30	107	(*)	—
950	30	545	25.0	66	30	549	21.6	57	30	513	32.6	18	30	562	19.5	68	30	547	14.1	70	30	545	(*)	—	30	550	18.0	64
900	30	1,018	22.9	62	30	1,014	18.4	61	30	990	28.8	18	30	1,021	16.9	66	30	999	12.1	72	30	1,009	(*)	—	30	1,009	15.0	67
850	30	1,515	20.3	59	30	1,502	15.2	65	30	1,493	24.5	20	30	1,506	13.5	68	30	1,477	9.4	73	30	1,495	15.9	64	30	1,491	11.6	67
800	30	2,036	17.2	55	30	2,013	12.4	58	30	2,019	20.1	23	30	2,014	10.1	67	30	1,977	6.4	73	30	2,007	12.4	66	30	1,995	8.4	64
750	30	2,587	13.8	52	30	2,555	9.5	54	30	2,577	15.4	27	30	2,553	6.8	60	30	2,504	2.9	71	30	2,549	9.1	67	30	2,529	6.1	55
700	30	3,163	10.4	43	30	3,122	6.1	49	30	3,150	10.7	32	30	3,112	3.4	59	30	3,060	4	61	30	3,113	5.6	66	30	3,090	3.3	53
650	30	3,777	6.0	43	30	3,725	2.4	46	30	3,766	6.3	30	30	3,714	0	57	30	3,632	-2.5	53	30	3,718	1.9	60	30	3,687	-1	52
600	30	4,426	1.1	45	30	4,368	-1.9	46	29	4,415	2.2	—	30	4,344	-3.8	52	30	4,283	-6.0	49	30	4,359	-2.1	51	30	4,324	-3.8	43
550	28	5,117	-3.6	46	30	5,066	-6.1	43	29	5,116	-2.5	—	28	5,027	-7.6	50	30	4,958	-9.7	48	30	5,043	-6.6	41	30	5,005	-7.4	45
500	27	5,867	-8.4	39	30	5,796	-10.7	38	27	5,864	-7.6	—	28	5,762	-11.9	50	30	5,690	-14.2	52	30	5,783	-11.3	36	30	5,743	-12.0	46
450	26	6,683	-13.4	—	30	6,606	-16.3	—	26	6,687	-13.6	—	28	6,572	-16.9	48	30	6,485	-19.7	55	30	6,589	-17.1	36	30	6,540	-17.5	48
400	25	7,561	-19.7	—	30	7,475	-22.6	—	25	7,561	-20.3	—	28	7,436	-23.1	—	30	7,347	-26.0	—	30	7,456	-23.4	—	29	7,415	-23.9	—
350	25	8,538	-26.9	—	30	8,441	-29.9	—	24	8,535	-28.2	—	28	8,399	-30.4	—	30	8,300	-32.8	—	30	8,418	-30.9	—	29	8,375	-31.2	—
300	25	9,631	-35.2	—	30	9,522	-37.7	—	24	9,623	-36.6	—	28	9,477	-33.6	—	30	9,368	-40.2	—	30	9,491	-39.4	—	29	9,450	-39.4	—
250	24	10,875	-44.0	—	30	10,755	-47.2	—	23	10,864	-46.0	—	27	10,706	-47.5	—	30	10,589	-48.1	—	30	10,712	-49.0	—	29	10,673	-48.4	—
200	23	12,342	-54.6	—	30	12,200	-56.5	—	23	12																		

TABLE 1.—Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during June 1948—Continued

Standard pressure surface (mb.)	Tampa, Fla (1,015.4 mb.)				Tatoosh Island, (1,014.1 mb.) Wash.				Toledo, Ohio (990.5 mb.)				Washington, D. C. (1,011.1 mb.)			
	Number of obser- vations	Dynamic height	Temperature	Relative humidity	Number of obser- vations	Dynamic height	Temperature	Relative humidity	Number of obser- vations	Dynamic height	Temperature	Relative humidity	Number of obser- vations	Dynamic height	Temperature	Relative humidity
Surface.....	29	9	25.6	80	30	31	13.0	88	30	191	18.3	73	30	25	21.6	76
1,000.....	29	144	25.2	80	30	149	12.7	85	30	108	18.3	73	30	121	22.1	70
950.....	29	597	22.6	76	30	584	12.2	73	30	556	18.4	64	30	571	20.7	61
900.....	29	1,034	20.0	68	30	1,033	11.9	58	30	1,013	15.7	65	30	1,033	18.1	62
850.....	29	1,555	16.7	68	30	1,510	9.9	57	30	1,496	12.8	68	30	1,520	14.8	66
800.....	29	2,069	13.3	68	30	2,012	7.3	54	30	2,003	9.6	66	30	2,031	11.5	65
750.....	29	2,611	9.9	63	30	2,546	4.6	48	30	2,544	6.4	64	30	2,570	8.2	62
700.....	29	3,180	6.8	54	30	3,100	1.5	50	30	3,099	3.2	61	30	3,135	4.9	59
650.....	29	3,783	3.3	51	30	3,697	-1.6	45	30	3,703	-1.1	59	30	3,741	1.4	58
600.....	29	4,431	-1.7	50	30	4,327	-5.3	42	30	4,334	-3.6	54	30	4,377	-2.3	55
550.....	29	5,121	-4.5	46	30	5,007	-9.4	43	30	5,021	-7.4	53	30	5,067	-6.3	55
500.....	29	5,866	-8.7	43	30	5,735	-14.0	41	30	5,755	-11.9	49	30	5,802	-10.8	51
450.....	29	6,681	-13.9	44	29	6,535	-19.7	41	29	6,564	-16.9	47	29	6,610	-15.9	43
400.....	29	7,500	-19.7		29	7,393	-26.0		29	7,429	-22.9		30	7,483	-21.8	
350.....	29	8,337	-26.7		29	8,346	-32.9		28	8,394	-29.9		30	8,451	-29.1	
300.....	29	9,180	-33.1		29	9,112	-40.7		28	9,474	-38.1		30	9,534	-37.3	
250.....	29	10,027	-44.7		28	10,024	-49.2		28	10,703	-47.9		30	10,768	-46.3	
200.....	29	10,875	-55.4		27	10,070	-54.9		28	12,143	-56.9		28	12,224	-55.9	
175.....	29	11,722	-60.9		25	12,928	-55.6		28	12,982	-59.8		26	13,064	-59.5	
150.....	29	12,569	-66.4		24	13,908	-54.4		26	13,940	-61.4		23	14,018	-61.6	
125.....	29	13,416	-71.9		24	15,073	-54.7		17	15,013	-59.6		14	15,126	-62.5	
100.....	29	14,263	-77.4		23	16,494	-55.3		11	16,417	-61.3		11	16,467	-60.7	
80.....	22	17,851	-67.2		21	17,915	-55.0		6	17,799	-59.7					
60.....	19	19,599	-63.0		15	19,769	-53.3		5	19,605	-58.1					
40.....	13	20,726	-60.2		10	20,914	-52.9									
					6	22,347	-51.8									

1 Data not yet received.

2 Insufficient observations.

(*) Temperature and relative humidity data for this level are not available or are available only for certain days. See note entitled "Change in Summarization of Radiosonde Data," p. 6, in the January 1946 issue of the MONTHLY WEATHER REVIEW.

NOTE.—All observations scheduled between 0300 and 0500, G. C. T. except at Ciudad Victoria, Mazatlan, and Merida, where they are taken near 0200, G. C. T.

"Number of observations" refers to those of dynamic height only. (In a few cases temperature or humidity data may be missing for one or more standard pressure surfaces

of some observations.) Relative humidity data are not published for standard pressure surfaces having a corresponding mean temperature below -20° C.

All relative humidity observations are obtained by electric hygrometer and have been adjusted to compensate for the values occurring below the operating range of the humidity element. For explanation of the adjustment see article entitled "Curve Method for Obtaining Monthly Means of Relative Humidity," p. 241, MONTHLY WEATHER REVIEW, December 1944.

None of the means included in these tables is based on less than 15 observations at the surface or 5 observations at a standard pressure level.

TABLE 2.—Free-air resultant winds based on pilot balloon observations made near 2200 G. C. T., during June 1948. Directions given in degrees from north (N=360°, E=90°, S=180°, W=270°). Speeds in meters per second

Altitude (meters) m. s. l.	Abilene, Tex. (534 m.)			Albuquerque, N. Mex. (1,627 m.)			Atlanta, Ga. (299 m.)			Billings, Mont. (1,095 m.)			Bismarck, N. Dak. (512 m.)			Boise, Idaho (868 m.)			Brownsville, Tex. (7 m.)			Buffalo, N. Y. (220 m.)			Burlington, Vt. (100 m.)			Charleston, S. C. (16 m.)			Cincinnati, Ohio (273 m.)			Denver, Colo. (1,618 m.)			El Paso, Tex. (1,198 m.)		
	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed			
Surface.....	30	163	3.7	30	246	2.3	30	268	2.5	30	28	2.3	30	329	0.6	30	318	3.8	30	135	6.6	29	247	4.3	29	293	1.0	30	188	2.5	30	252	2.2	30	86	1.9	30	228	2.0
500.....	30	172	4.7	30	272	3.4	30	272	3.4	30	31	2.1	30	349	1.0	30	313	4.0	29	141	8.1	29	252	5.6	29	289	2.0	30	208	4.0	30	259	3.2	30	259	3.2	30	230	2.6
1,000.....	30	177	4.3	30	274	3.5	30	274	3.5	30	31	2.1	30	312	1.3	30	313	3.5	29	150	6.5	29	260	6.9	28	286	3.3	30	241	3.2	30	269	4.8	30	230	2.6			
1,500.....	30	177	4.3	30	274	3.5	30	275	4.1	30	31	2.1	30	312	1.3	30	313	3.5	29	150	6.5	29	260	6.9	28	286	3.3	30	241	3.2	30	269	4.8	30	230	2.6			
2,000.....	29	181	4.6	30	247	3.3	27	288	5.0	29	48	1.2	28	313	2.6	30	315	2.1	24	145	3.6	25	273	8.1	25	278	7.6	28	282	4.5	26	285	6.0	30	75	2.5	30	233	3.3
2,500.....	28	185	3.9	30	245	3.4	26	295	3.8	25	275	1.1	22	312	4.0	30	297	1.4	24	139	2.9	23	277	8.7	21	288	8.6	27	285	5.5	24	279	8.4	30	110	1.8	30	235	3.9
3,000.....	27	197	2.3	30	238	3.7	25	302	4.9	22	274	3.2	15	310	4.8	29	235	1.2	22	120	2.8	21	281	10.2	17	291	9.8	26	290	5.6	18	276	9.8	29	184	1.6	30	235	3.9
4,000.....	26	277	1.6	30	243	6.3	18	294	6.9	16	255	5.6	15	306	8.6	26	192	3.3	21	99	1.9	20	281	10.2	10	285	13.0	21	280	5.5	17	280	5.1	27	257	4.8	30	244	4.3
5,000.....	24	304	3.7	29	242	9.4	13	300	7.3	13	267	6.9	11	305	9.2	22	218	5.5	19	33	2.0	20	281	10.2	17	291	9.8	26	290	5.6	18	276	9.8	29	184	1.6	30	235	3.9
6,000.....	21	304	5.1	28	249	11.4	11	280	7.5	13	267	6.9	11	305	9.2	22	218	5.5	19	33	2.0	20	281	10.2	17	291	9.8	26	290	5.6	18	276	9.8	29	184	1.6	30	235	3.9
8,000.....	14	300	7.2	24	247	12.9	11	280	7.5	13	267	6.9	11	305	9.2	22	218	5.5	19	33	2.0	20	281	10.2	17	291	9.8	26	290	5.6	18	276	9.8	29	184	1.6	30	235	3.9
10,000.....	14	300	7.2	24	247	12.9	11	280	7.5	13	267	6.9	11	305	9.2	22	218	5.5	19	33	2.0	20	281	10.2	17	291	9.8	26	290	5.6	18	276	9.8	29	184	1.6	30	235	3.9
12,000.....	14	300	7.2	24	247	12.9	11	280	7.5	13	267	6.9	11	305	9.2	22	218	5.5	19	33	2.0	20	281	10.2	17	291	9.8	26	290	5.6	18	276	9.8	29	184	1.6	30	235	3.9

Altitude (meters) m. s. l.	Ely, Nev. (1,910 m.)			Grand Junction, Colo. (1,475 m.)			Greensboro, N. C. (271 m.)			Havre, Mont. (767 m.)			Jacksonville, Fla. (16 m.)			Joliet, Ill. (178 m.)			Las Vegas, Nev. (575 m.)			Little Rock, Ark. (88 m.)			Medford, Oreg. (416 m.)			Miami, Fla. (12 m.)			Mobile, Ala. (66 m.)			Nashville, Tenn. (194 m.)			New York N. Y. (15 m.)		
	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed			
Surface.....	30	186	4.8	30	272	1.7	29	256	0.6	28	103	0.9	28	115	3.4	30	291	1.4	30	201	2.7	29	221	1.8	30	308	2.3	30	117	3.5	29	189	2.8	30	269	2.8	28	190	1.9
500.....	30	186	4.8	30	272	1.7	29	256	0.6	28	103	0.9	28	115	3.4	30	291	1.4	30	201	2.7	29	221	1.8	30	308	2.3	30	117	3.5	29	189	2.8	30	269	2.8	28	190	1.9
1,000.....	30	186	4.8	30	272	1.7	29	256	0.6	28	103	0.9	28	115	3.4	30	291	1.4	30	201	2.7	29	221	1.8	30	308	2.3	30	117	3.5	29	189	2.8	30	269	2.8	28	190	1.9
1,500.....	30	186	4.8	30	272	1.7	29	256	0.6	28	103	0.9	28	115	3.4	30	291	1.4	30	201	2.7	29	221	1.8	30	308	2.3	30	117	3.5	29	189	2.8	30	269	2.8	28	190	1.9
2,000.....	30	184	4.9	30	256	2.7	25	2																															

TABLE 2.—Free-air resultant winds based on pilot balloon observations made near 2200 G. C. T., during June 1948. Directions given in degrees from north ($N=360^\circ$, $E=90^\circ$, $S=180^\circ$, $W=270^\circ$). Speeds in meters per second—Continued

Altitude (meters) m. s. l.	Oakland, Calif. (8 m.)			Oklahoma City, Okla. (396 m.)			Omaha, Nebr. (306 m.)			Phoenix, Ariz. (338 m.)			Rapid City, S. Dak. (982 m.)			St. Cloud, Minn. (318 m.)			St. Louis, Mo. (181 m.)			San Antonio, Tex. (240 m.)			San Diego, Calif. (13 m.)			Sault Ste. Marie, Mich. (225 m.)			Seattle, Wash. (116 m.)			Spokane, Wash. (725 m.)			Washington, D. C. (24 m.)					
	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed						
Surface.....	30	274	5.1	29	165	3.5	30	10	0.8	30	250	1.7	29	56	1.5	30	299	2.3	29	258	2.3	30	144	4.0	29	260	3.3	25	294	4.6	29	266	1.4	30	222	1.6	30	244	0.9			
500.....	30	274	5.1	29	165	4.1	30	10	0.6	30	247	2.6	29	57	1.5	30	295	2.4	29	260	3.4	30	156	4.8	29	262	2.9	25	298	6.0	29	293	1.5	30	245	2.2						
1,000.....	28	273	2.5	29	183	5.5	28	336	1.8	30	243	3.6	29	57	1.5	30	287	2.8	29	257	4.8	30	148	5.4	24	241	1.2	25	298	6.0	28	280	1.1	30	231	2.1	29	243	3.3			
1,500.....	26	276	1.4	29	196	6.1	27	303	2.2	30	224	3.7	29	58	0.6	27	275	3.2	28	263	6.3	30	146	5.5	22	270	1.7	22	295	6.3	20	304	1.1	29	231	1.9	29	262	3.8			
2,000.....	25	261	0.8	25	222	5.9	22	288	4.1	30	209	4.7	27	265	0.9	20	290	3.7	27	272	7.1	29	143	5.0	21	252	2.2	21	293	6.3	16	269	1.1	28	240	2.0	27	273	6.0			
2,500.....	25	358	0.5	25	242	5.6	20	298	6.0	30	205	6.4	22	271	3.1	16	315	3.7	25	275	8.3	28	152	4.0	20	237	3.8	20	292	7.7	14	233	1.0	27	242	1.7	29	281	7.8			
3,000.....	25	317	0.5	22	266	6.5	19	301	8.4	30	211	7.2	19	295	5.4	13	302	4.5	23	285	8.7	27	158	3.0	20	230	4.9	18	293	8.2	10	216	3.5	23	232	2.4	25	288	9.6			
4,000.....	24	294	3.5	20	280	8.5	17	299	11.2	30	215	9.2	17	285	8.8	11	297	5.5	19	284	10.1	20	49	1.1	17	225	7.2	14	308	12.5	10	232	4.2	18	251	2.8	19	296	11.5			
5,000.....	23	286	5.6	17	285	8.9	14	296	11.1	27	222	10.7	13	281	10.5	10	296	8.8	12	308	13.6	16	2	2.8	16	223	9.6	10	307	11.6	10	227	5.2	13	271	4.3	15	283	12.9			
6,000.....	22	289	8.3	13	305	8.1	14	304	10.4	25	222	13.3	---	---	---	---	---	---	10	302	15.8	15	340	4.2	16	233	11.4	---	---	---	---	---	---	---	---	---	---	---	---	---		
8,000.....	16	287	8.5	---	---	---	12	301	12.8	17	232	19.1	---	---	---	---	---	---	---	---	---	11	320	7.9	13	232	17.2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
10,000.....	---	---	---	---	---	---	10	301	17.0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

TABLE 3.—Free-air resultant winds based on rawin observations made near 0300 G. C. T., during June 1948. Directions given in degrees from north ($N=360^\circ$, $E=90^\circ$, $S=180^\circ$, $W=270^\circ$). Speeds in meters per second

Altitude (meters) m. s. l.	Albuquerque, N. Mex. (1,636 m.)			Big Spring, Tex. (774 m.)			Bismarck, N. Dak. (505 m.)			Brownsville, Tex. (7 m.)			Caribou, Maine (191 m.)			Charleston, S. C. (13 m.)			Columbia, Mo. (237 m.)			Grand Junction, Colo. (1,473 m.)			Greensboro, N. C. (275 m.)			Hatteras, N. C. (3 m.)			International Falls, Minn. (358 m.)			Little Rock, Ark. (80 m.)			Miami, Fla. (12 m.)				
	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed					
Surface.....	30	164	1.6	30	146	4.7	30	57	1.7	30	131	4.9	30	292	1.2	30	178	1.4	30	148	1.4	30	239	0.7	29	242	0.7	30	216	1.9	30	304	0.7	30	189	1.1	30	112	1.3		
500.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
1,000.....	---	---	---	30	157	8.4	30	62	1.7	30	141	10.7	29	289	2.3	30	220	4.3	30	187	2.2	29	234	2.1	29	227	3.9	30	315	1.6	30	192	3.6	30	192	3.6	30	135	3.2		
1,500.....	---	---	---	30	169	9.1	30	53	2.1	30	144	8.4	29	288	3.8	30	247	2.9	30	254	2.6	29	282	3.3	29	262	3.9	30	328	3.6	30	206	3.5	30	206	3.5	30	128	2.8		
2,000.....	30	236	3.6	30	181	6.6	30	337	2.1	30	142	5.9	29	288	6.9	30	298	4.0	30	272	5.4	30	245	3.2	28	293	4.6	29	272	5.0	30	312	4.7	30	229	3.8	30	107	1.9		
2,500.....	30	247	4.7	30	192	3.3	30	360	2.6	30	137	4.6	30	288	7.3	30	301	4.4	30	287	6.1	30	231	3.8	27	299	4.8	29	271	5.4	29	308	5.4	30	253	3.6	30	119	1.4		
3,000.....	30	251	5.4	30	239	2.2	30	309	4.6	30	127	3.8	30	284	8.0	30	299	4.7	30	293	7.0	30	231	3.7	26	299	5.5	29	273	5.8	28	308	5.8	30	266	4.3	30	148	1.2		
4,000.....	30	247	6.4	30	328	3.7	30	300	7.3	30	104	1.2	28	270	8.3	29	296	3.7	30	291	9.5	30	231	5.1	23	292	8.7	29	271	6.5	28	294	7.8	30	276	6.0	30	202	1.7		
5,000.....	30	247	8.4	30	321	4.9	30	302	9.7	30	74	2.1	28	289	11.4	27	294	4.3	29	295	10.7	30	233	7.1	21	287	8.8	27	280	7.9	27	298	9.9	30	280	6.6	30	224	2.4		
6,000.....	30	248	10.3	30	295	5.2	30	300	10.6	30	20	2.4	28	272	11.5	27	273	5.8	29	292	10.8	30	241	9.1	19	288	9.7	25	273	7.7	25	294	12.0	30	282	7.0	30	251	3.6		
8,000.....	26	248	16.1	30	272	8.3	28	288	14.1	30	341	4.7	24	271	15.0	27	266	6.8	26	261	18.8	21	245	17.4	16	257	10.8	17	290	13.2	19	264	22.8	25	271	15.4	24	242	12.5		
10,000.....	---	---	---	30	270	13.3	28	276	17.2	30	327	9.2	18	281	17.5	26	262	7.0	27	265	17.3	28	255	17.2	17	281	7.9	20	287	11.1	21	267	19.4	29	285	11.7	25	250	8.5		
12,000.....	---	---	---	29	267	15.3	24	261	20.0	27	323	13.2	---	---	---	22	259	6.8	26	261	18.8	21	245	17.4	16	257	10.8	17	290	13.2	19	264	22.8	25	271	15.4	24	242	12.5		
14,000.....	---	---	---	28	268	15.1	20	267	14.5	24	316	10.5	---	---	---	22	257	4.7	13	281	19.2	24	249	15.7	14	275	11.3	---	---	---	12	270	15.1	21	281	18.4	---	---	---	---	
16,000.....	---	---	---	15	272	9.7	16	283	9.4	14	346	4.6	---	---	---	11	269	5.0	---	---	---	10	248	9.3	11	284	3.4	---	---	---	---	---	---	10	293	10.4	---	---	---	---	---

Altitude (meters) m. s. l.	Nantucket, Mass. (14 m.)			Nashville, Tenn. (177 m.)			New Orleans, La. (6 m.)			Oakland, Calif. (31 m.)			Oklahoma City, Okla. (392 m.)			Rapid City, S. Dak. (980 m.)			St. Cloud, Minn. (318 m.)			San Antonio, Tex. (242 m.)			San Juan, P. R. (28 m.)			Santa Maria, Calif. (72 m.)			Sault Ste. Marie, Mich. (224 m.)			Spokane, Wash. (726 m.)			Tatoosh Island, Wash. (33 m.)				
	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed		
Surface.....	28	204	1.4	30	204	1.2	30	193	2.0	30	279	5.4	28	145	2.7	30	114	0.7	30	16	0.7	30	143	6.1	30	124	2.9	30	275	4.4	30	289	1.8	30	221	0.9	30	227	2.6		
500.....	28	254	4.1	30	268	1.1	30	201	3.2	30	285	5.1	28	152	4.0	30	107	0.7	30	18	0.3	30	139	7.7	30	101	7.9	30	311	3.8	30	319	3.8	30	227	4.3	30	275	4.3		
1,000.....	28	273	4.3	30	269	2.6	29	159	1.4	30	333	7.6	26	176	5.7	30	107	0.7	30	315	0.6	30	146	7.9	30	104	8.2	30	319	3.7	30	307	3.9	30	225	2.5	30				
1,500.....	28	279	5.6	30	269	4.0	29	82	2.5	30	375	7.7	24	196	5.5	30	212	0.8	29	299	2.3	30	155	5.1	30	103	7.7	30	12	1.6	29	292	3.7	30	304	1.1	28	228	3.2		
2,000.....	27	276	6.0	30	268	5.2	29	76	2.9	30	330	6	23	221	5.1	30	283	1.5	29	310	3.8	29	169	3.4	30	101	7.4	30	63	1.4	29	289	4.9	30	239	1.8	28	277	2		
2,500.....	28	273	7.3	30	271	5.9	29	58	2.1	30	339	8	24	246	4.9	30	291	3.6	29	308	4.4	29	167	2.7	30	99	6.9	30	208	2	28	287	6.5	30	263	1.7	28	236	1.4		
3,000.....	26	276	9.0	28	273	5.9	29	41	2.0	30	279	1.3	24	269	4.5	30	298	6.0	29	300	4.0	29	153	1.9	30	97	6.4	30	263	1.9	28	281	7.6	30	265	2.1	28	260	2.8		
4,000.....	26	271	11.1	28	286	7.8	30	344	2.3	30	287	3.2	25	297	6.5	30	299	9.4	29	288	7.9	28	9	30	103	5.3	30	269	4.6	28	289	9.5	30	255	3.4	27	261	4.0			
5,000.....	26	274	12.4	28	302	9.6	30	328	3.2	30	285	4.8	27	290	7.5	30	290	11.3	28	283	10.5	27	11	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
6,000.....	25	279	13.6	27	303	9.7	28	343	3.9	30	280	6.9	25	284	8.6	30	287	12.1	28	278	11.9	27	332	2.8	29	85	8.3	30	263	9.1	25	293	15.6	30	246	3.7	27	262	6.8		
8,000.....	21	282	17.8	24	293	9.4	28	330	5.4	27	289	9.8	23	291	12.6	30	282	14.0	27	276	15.6	29	311	6.9	29	68	3.4	29	254	11.8	22	286	21.2	29	246	4.5	22	258	4.9		
10,000.....	18	296	20.4	29	298	14.0	27	333	6.8	22	289	11.5	22	275	18.1	30	298	17.5	25	273	20.3	26	297	9.4	29	26	2.9	23	204	14.2	10	289	23.1	24	203	5.5	19	236	2.9		
12,000.....	12	279	19.5	13	279	16.4	24	342	7.0	17	285	11.6	18	277	20.1	27	255	18.7	17	260	21.6	26	297	13.1	29	348	6.3	13	266	15.2	---	---	---	16	199	7.1	15	311	6.2		
14,000.....	---	---	---	23	340	7.9	---	---	---	---	---	---	14	282	21.3	25	265	15.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	14	242	4.4	12	256	4.1	
16,000.....	---	---	---	11	332	8.6	---	---	---	---	---	---	---	---	---	16	263	10.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	11	220	4.0	13	221	3.8	
18,000.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

RIVER STAGES AND FLOODS FOR JUNE 1948

ELMER R. NELSON

River stages during June were mostly below normal, except in the Northeastern States, the extreme Upper Mississippi and Lower Missouri Basins, and scattered points throughout the country. The greatest negative departure was at Vicksburg, Miss., where the stage of the Mississippi averaged 17.8 feet below normal. Precipitation in the Southern States during the month averaged one-half of normal except in the northwest quadrant, where it averaged up to two times normal. Precipitation over the rest of the country was mostly above normal, except along the Pacific Coast and the northern portion of the North-central and the New England States. It was also below normal over a large area extending southward and westward from the Upper Great Lakes Region.

The Rio Grande at Lobatos Bridge, Colo., exceeded the record crest of 1941 by 1 foot and approached within one-half foot of the record flood of 1932 at Del Rio, Tex. Near-record stages were reached on the Deep Fork Creek in Oklahoma and other smaller streams in Arkansas. The Columbia River receded slowly from its 3d crest at Portland, Oreg., on the 14th to below flood stage on July 3, 43 days after flood stage began on May 22. At Vancouver, Wash., flood stage prevailed from May 19 to July 8. The Marias River reached the highest peak in history at Shelby, Mont., exceeding the previous high of 1907. Several flash floods were reported in the Rocky Mountain States, Texas, and Oklahoma as a result of excessive precipitation.

Atlantic Slope drainage.—Light overflow occurred on the Roanoke at Williamston, N. C., from the 3d to the 6th, due to heavy local rains. No damage was reported.

Missouri Basin.—The Upper Missouri River, which exceeded bank-full stage from Three Forks, Mont., to the Fort Peck Reservoir from June 5–8, caused considerable crop damage and scattered structural and livestock losses. The Sun River flooded the town of Sun River, Mont., and the Sun River portion of Great Falls, Mont., on June 4–6. Flood waters remained in some low places for 2 or 3 weeks. All western Montana streams were near or above capacity flow for about 2 weeks prior to the flooding. Rapid melting of the heavy snow pack in the mountains was caused by the unseasonably warm weather after the middle of May. The stage, therefore, was set for severe flooding with the onset of heavy rains over the basin early in June. Helena, Mont., reported 1.53 inches during the 48-hour period ending on the 4th. Similar heavy rains which occurred over the headwaters where the Missouri forms at Three Forks, in southwestern Montana, caused a crest 2 feet above bank-full stage at Toston, Mont. The crest passed Helena, Mont., around noon on the 5th, and Canyon Ferry, Mont., early on the 7th. The flow at the latter point was the highest in 50 years of record (34,000 cfs.). Numerous rural and urban families were evacuated between Cascade and Sun River, Mont.; at least 50 families were forced out of their homes in the latter community. The flood waters caused the Sun River to cut a new channel about 1½ miles southwest of Sun River, Mont. Approximately 4,000 acres of farm land were cut off.

The Marias River reached the highest peak in history at Shelby, Mont., on June 18 (39,900 cfs.), exceeding the previous high of 29,500 cfs. in 1907. This flood which covered the entire Marias basin was caused by a record-breaking 2-day rainfall which covered about 5,000 square miles.

The storm that produced this record flood began during the night of the 15–16th and ended late in the after-

noon of the 17th, approximately 40 hours later. It resulted from a rather steady east-northeasterly flow of moist, conditionally unstable air up the east slope of the Continental Divide. The rainfall was the heaviest in the west and central portions of Teton and Pondera Counties in western Montana. Approximately 600 square miles received a total of 8 or more inches; 2,500 square miles, 6 or more inches; and over 5,000 square miles, more than 3.5 inches. It was the heaviest 48-hour rainfall on record in the area.

The flood resulting from the rainstorm was very damaging. State and U. S. Highways were closed when bridges were inundated and several bridge approaches washed out. Severe damage resulted to county roads in Pondera County. It has been estimated that it may take 2 years to repair the damaged roads. The Cut Bank-Shelby oil fields were closed down for about 4 days; several wash-outs occurred on the branch lines of the Great Northern Railroad; and considerable damage resulted from flooded basements and to irrigation projects. Crop damage was relatively small due to the late season, but considerable lowland acreage remained under water for several weeks and may not produce any crops this year.

White Basin.—Minor flooding occurred along the White and Black Rivers in Arkansas as a result of the heavy rains over Oklahoma during the last one-third of the month. The inundation of more than 12,000 acres caused considerable damage to crops in the flood plain.

Arkansas Basin.—Considerable flooding occurred in the Arkansas Basin during the latter part of June as a result of widespread heavy thundershowers during the last decade.

A severe flash flood, which caused considerable damage, occurred in the Kingfisher, Okla., area due to extremely heavy rains, reported unofficially as around 20 inches.

The Verdigris River from Claremore to Inola, Okla., exceeded bank-full stage by 8 to 10 feet; the Arkansas from Webbers Falls, Okla., to Van Buren, Ark., by 7 to 8 feet; and the Neosho at Oswego, Kans., by nearly 8 feet. Minor flooding occurred along the lower Arkansas from Ozark to Pine Bluff, Ark.

The severe damage that resulted was due more to the widespread flooding and duration of flooding than to excessively high stages.

The heaviest 24-hour rainfall amounts reported officially were 8 to 10 inches, but unofficial reports of 10 to 15 inches were common.

A tabulation of the average daily rainfall in the various basins during the last decade of June is given in Table 1.

TABLE 1.—Average rainfall (inches) for June 1948

Basins	21	22	23	24	25	26	27	28	29	Total
Cottonwood.....	1.65	1.00	0.50	.....	1.25	0.10	0.90	0.90	0.20	6.30
Neosho:										
Council Grove, Kans.—										
Erie, Kans.....	.95	1.20	.40	.05	1.00	.30	.25	.65	.10	4.90
Erie, Kans.—Grand Lake,										
Okla.....	2.10	6.60	.30	.25	.25	1.25	.25	.20	.05	11.75
Below Grand Lake, Okla.	1.30	3.50	2.10	2.00	T	.50	.60	1.00	.15	11.15
Verdigris:										
Above Independence, Kans.	1.00	1.60	.20	T	1.00	.60	.15	.35	.05	4.95
Below Independence,										
Kans.....	1.00	4.00	1.00	.50	T	3.50	.50	.50	.10	11.10
Caney.....	.85	3.75	.25	.10	T	2.50	.50	.50	T	8.45
Bird Creek.....	.75	4.00	1.00	.05	T	1.50	.50	.50	T	8.30
Cimarron:										
Okeene, Okla.—Perkins,										
Okla.....	.75	1.00	3.50	.10	T	.50	.50	1.15	.20	7.70
Perkins, Okla. to Mouth..	1.35	3.25	3.00	.25	T	.75	.35	.75	.25	9.95
Arkansas:										
Great Bend, Kans. to										
Arkansas City, Kans....	.75	1.00	.25	T	.80	.80	.85	1.05	.10	5.60
Arkansas City, Kans.—										
Tulsa, Okla.....	.50	3.30	1.00	.10	T	1.25	.40	.60	.20	7.35
Tulsa, Okla.—Fort Smith,										
Ark.....	.90	.50	1.25	3.00	T	.30	.50	.65	.25	7.35
Little Arkansas.....	.90	.90	.50	.....	1.10	.75	1.10	1.65	T	6.90

Heavy to excessive rainfall occurred over the North and South Canadian River Basins during the same period.

The first storm passed over the lower portion of the basin in the East-central portion of Oklahoma on the 20th. The heavy rain which continued through the 24th caused sharp rises and flooding in the North and South Canadian and Deep Fork Rivers. The Deep Fork River at Dewar, Okla., approached within $1\frac{1}{2}$ feet of the record stage of 26.67 feet reached in 1945. Additional light to heavy rain occurred again in this area from the 26th to 29th. The total rainfall during the 8-day period in this area ranged from 6 to $15\frac{1}{2}$ inches. Okmulgee, Okla., reported $14\frac{1}{2}$ inches during the first 4 days, and Wetumka and Wewoka, Okla., 11 to 12 inches.

The second storm area was centered over the west-central portion of Oklahoma and extended northeastward from Weatherford to Hennessy. Eleven and one-fourth inches of rain fell at Geary, Okla., between 4:30 p. m. of the 22d and 7:00 a. m. (CST) of the 23d. In the center of the most intense rainfall, estimates based on unofficial measurements indicated the rainfall during the 8- to 12-hour period ranged up to 19 inches or more. Sharp rises occurred on both the North and South Canadian Rivers, with El Reno cresting less than 2 feet below bank-full stage about 24 hours after the passage of the storm. The heavy flow caused considerable flooding of lowlands around Yukon and Oklahoma City on the North Canadian, and from Union City, Okla., to below Whitefield, Okla., on the South Canadian. The previous high stage of 17.75 feet at Whitefield on May 6, 1941, was exceeded by 3 feet. Flash floods on Deer Creek, a tributary of the South Canadian, near Hydro, Okla., trapped several motor vehicles on Highway 66 and drowned 10 persons. A survey of unofficial measurements found that as much as 19 inches of rain fell in this area in 5 hours.

The third storm area was centered over the Panhandle and the extreme northwestern portion of Oklahoma. This storm produced from 1 to nearly 4 inches of rain between the 24th and 27th and caused the North Canadian to exceed bank-full stage by $\frac{1}{2}$ foot at Woodward, Okla.

A flash flood occurred on Boggs Creek, west of Pueblo, Colo., due to a severe rain- and hailstorm during the evening of June 12, 1948. A total of 2.90 inches of rain occurred in less than 3 hours. A family of three was drowned. Most of the damage was to flooded basements in the business district and to windows and electric signs, from hailstones measuring up to $1\frac{1}{4}$ inches in diameter.

West Gulf of Mexico drainage.—The Sabine River crested at bank-full stage at Logansport, La., on the 2d as a result of heavy rains during May. The resulting damage was negligible.

Sharp rises occurred on the Llano and the Pedernales Rivers in Texas, due to heavy rains over the Edwards Plateau. There was some local flooding on the 25th.

A secondary rise occurred in the Upper Rio Grande in New Mexico during the first 10 days of June from snow melt, with crests near those of the first rise of the latter part of May. The secondary rise is usually much less than the primary one and in most cases it does not reach bank-full stage. This season, however, there were unusually heavy snowfalls from Wolf Creek Pass eastward, and also at the higher levels. On the 7th, the Rio Grande crested at a record stage of 7.7 feet at Lobatos Bridge, Colo., 1 foot above the previous high of May 16, 1941; and at Embudo, N. Mex., 1.6 feet below the

previous high of 14 feet of 1941. Rising stages, due to rainfall, continued from the 1st to the 7th at Embudo, merging with the secondary rise and cresting on the 7th at 4 p. m.; and at Otowi Bridge, N. Mex., from the 4th to the 8th, cresting at 8 a. m. on the latter date. The greatest discharge at San Acacia, N. Mex., was 10,500 cfs. on the 10th, and 10,100 cfs. at San Marcial, N. Mex., on the 11th. Although the secondary crests were slightly higher at Lobatos and Embudo, they were slightly lower at Otowi and below, as the El Vado Dam was discharging at half the rate as compared to the first crest. Peak discharges at Del Norte and Monte Vista, N. Mex., were lower during the second crest.

Flash floods occurred on Hondo River at Roswell, N. Mex., on the 2d and 3d due to heavy rains and thunder-showers in the mountains. The first crest reached Roswell about 5 p. m. on the 2d. The lower sections of the city were flooded to depths of 10 to 12 inches. The second crest, which reached Roswell about 11 p. m. on the 3d, flooded the same sections to depths of 1 to 3 feet and covered 215 city blocks. Some residential basements were flooded, and water ran curb deep in the downtown section but was prevented from entering business establishments by the use of sand bags.

A flash flood occurred at Las Vegas, N. Mex., on the night of June 2, as a result of excessive rainfall during a short period. The Las Vegas Airport Station reported 2.40 inches of rain from 5 to 8:30 p. m. on the second. Residents of a lowlands tourist court were evacuated for a short period. The unusually heavy rain caused serious obstruction to the flume supplying water to Peterson Reservoir, damaging and breaking the flume at one point. The most serious result of the flood was the contamination of the water supply. A large volume of muddy water flowed into the Peterson Reservoir as the flood gate on the storm ditch surrounding the lake was lost. The greater portion of the city's population was inoculated against typhoid fever. Considerable damage was done to highways and railroads at Watrous, N. Mex., by heavy rains and flash floods on the small streams in the area.

Flash floods occurred at Carlsbad, N. Mex., on the night of May 31–June 1 and at Artesia, N. Mex., on the night of June 1–2, as a result of excessive precipitation during a short interval. Of the 3.75 inches reported on June 1 at Artesia, 2.75 inches fell in 35 minutes. The total during the 48-hour period ending June 1 was 5.60 inches. Streets, highways, residences, and business establishments in Artesia were flooded to depths of several inches. Residents in the San Jose area near Carlsbad were evacuated.

Torrential rains north and northeast of Del Rio, Tex., on the 24th caused a record rise on Sycamore Creek, 12 miles east of Del Rio, and a near-record rise on the Rio Grande from Del Rio to Laredo, Tex., where it approached within 2 to 4 feet of the record stage of September 1932. The greater portion of the rain fell over an area approximately 30 miles wide and 75 miles long. A survey of unofficial measurements found that rain in excess of 24 inches occurred over a 6- to 12-hour period with a probable average of 15 to 20 inches over most of the area.

Most of the damage was to highways, railroads, utility companies, and ranches along Devil's River and Sycamore and Pinto Creeks. All communication and power service was completely disrupted for several hours. One death was reported in Devil's River.

FLOOD STAGE REPORT FOR JUNE 1948

[All dates in June unless otherwise specified]

River and station	Flood stage	Above flood stages— dates		Crest ¹	
		From—	To—	Stage	Date
ATLANTIC SLOPE DRAINAGE					
Roanoke: Williamston, N. C.....	Feet 10	3	6	Feet 10.4	5
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Mississippi: Louisiana, Mo.....	12	{ 20 25 29	{ 22 28 (9)	12.1 12.1 12.2	21 26, 27 30
MISSOURI BASIN					
Solomon: Beloit, Kans.....	18	29	30	20.0	29
Republican:		May 30	May 31	6.6 7.7 8.0 14.0 6.6 7.4 8.6	May 30 15 17 21 26 26-27 28
Cambridge, Nebr.....	5	{ 12	29	{ 14.0 6.6 7.4 8.6	{ 21 26 26-27 28
Gulde Rock, Nebr.....	10	{ 24 27	{ 24 29	{ 10.7 10.6	{ 24 29
Clay Center, Kans.....	15	28	30	16.25	29
White Basin					
Black: Black Rock, Ark.....	14	19	20	16.0	20
White: Batesville, Ark.....	23	20	21	24.3	20
Arkansas Basin					
Little Arkansas:					
Sedgwick, Kans.....	18	{ 26 28	{ 26 30	18.4 22.7	26 28
Ripley, Kans.....	11	29	30	11.6	29
Minnescah: Peck, Kans.....	17	29	30	18.7	29
Cimarron: Perkins, Okla.....	11	{ 23 28	{ 24 29	13.3 12.8	24 29
Verdigris:					
Independence,.....	30	{ 22 26	{ 24 27	38.5 33.3	23 26
Coffeyville, Kans.....	20	23	24	22.2	22-23
Claremore, Okla.....	38	23	July 1	46.4	27
Inola, Okla.....	41.5	23	July 3	52.2	28
Neosho:					
Parsons, Kans.....	24	22	23	26.3	22
Oswego, Kans.....	17	22	24	25.6	23
Deep Fork: Dewar, Okla.....	18	22	(?)	25.2	24
North Canadian:					
Woodward, Okla.....	5	28	28	5.6	28
Yukon, Okla.....	11	23	26	17.2	24
East Oklahoma City, Okla.....	14	22	23	14.1	22
Wetumka, Okla.....	14	21	26	22.0	24
Canadian:					
Union, Okla.....	6	23	23	10.0	23
Calvin, Okla.....	15	24	24	15.2	24
Whitefield, Okla.....	16.5	23	26	20.8	24
Arkansas:					
Great Bend, Kans.....	8	30	30	8.4	30
Oxford, Kans.....	14	29	30	14.3	30
Arkansas City, Kans.....	16	27	July 2	18.6	July 1
Webbers Falls, Okla.....	23	23	July 4	30.6	24
Fort Smith, Ark.....	22	24	July 5	29.7	26
Van Buren, Ark.....	22	24	July 5	30.6	26
Ozark, Ark.....	22	25	July 4	25.2	29
Dardanelle, Ark.....	22	25	July 5	27.1	28
Morrilton, Ark.....	30	26	July 5	31.2	28

See footnotes at end of table.

FLOOD STAGE REPORT FOR JUNE 1948—Continued

River and station	Flood stage	Above flood stages— dates		Crest ¹	
		From—	To—	Stage	Date
WEST GULF OF MEXICO DRAINAGE					
Sabine: Logansport, La.-----	Feet 25	2	2	Feet 25	July 2
Rio Grande:					
Lobatos Bridge, Colo.-----	4	May 19	18	7.3 7.7 6.1	May 26 7 13, 14
Embudo, N. Mex.-----	8	May 22	18	12.3 12.4	May 27 7
Espanola, N. Mex.-----	7	May 21	17	8.7 8.8 8.9	27 8 8
Otowi Bridge, N. Mex.-----	9	7	8	9.2	8
Albuquerque, N. Mex.-----	4	3	11	4.6	8
Del Rio, Tex.-----	15	24	25	33.5	24
Eagle Pass, Tex.-----	16	24	26	46.9	25
Laredo, Tex.-----	30	26	27	45.3	26
GULF OF CALIFORNIA DRAINAGE					
Colorado Basin					
Animas: Durango, Colo.-----	4	May 15	21	7.2 6.2	20 4
PACIFIC SLOPE DRAINAGE					
Columbia Basin					
Kootenai:					
Libby, Mont.-----	18	May 25	12	19.6	May 28
Bonners Ferry, Idaho.-----	31	May 23	12	35.3	May 29
Flathead:					
Columbia Falls, Mont.-----	13.2	May 19	9	19.5	May 23
Somers, Mont.-----	93	May 26	21	96.0	6-8
Polson, Mont.-----	15.6	May 25	22	21.3	7
Clark Fork: St. Regis, Mont.-----	17	May 21	10	20.6	May 24
St. Joe:					
Calder, Idaho.-----	87	May 18	4	89.0	May 28
St. Maries, Idaho.-----	35	May 19	7	39.2	May 30
Coeur d'Alene:					
Cataldo, Idaho.-----	40	May 8	-----	42.6	May 25, 26
Coeur d'Alene Lake, Idaho.-----	30	May 1	16	36.0	May 30
Spokane: Spokane, Wash.-----	27	May 23	7	28.3	May 30, 31
Willamette: Portland, Oreg.-----	18	May 22	July 3	29.95 29.7 30.0	1 6 14
Salmon: White Bird, Idaho.-----		May 28	May 30	32.5	May 29
Clearwater:				32.6	4
Kamiah, Idaho.-----	14	May 20	10	21.2 15.0	May 29 8
Spalding, Idaho.-----		May 28	May 29	23.0	May 29
Columbia:					
Boundary, Wash.-----	32	May 27	30	45.0	11-12
Trinidad, Wash.-----		May 21	July 11	56.9 59.4 30.5	May 30 12 May 30- 31
Umatilla, Oreg.-----	25	May 27	21	29.7 34.6	11 May 31
Celilo, Oreg.-----		May 22	July 2	33.7 51.8	12 May 31
The Dalles, Oreg.-----		May 22	-----	50.8 30.2	12 30.2
Vancouver, Wash.-----	15	May 19	July 8	30.0 30.2	6 13, 14

¹ Provisional.² Overflow due to operation of dam.³ Continued at end of month.

ESTIMATED FLOOD LOSSES FOR 1944 AND 1945¹

BENNETT SWENSON

Monetary losses from floods in the United States have been estimated at about \$94,000,000 for the year 1944, and nearly \$166,000,000 for 1945. A total of 119 lives were lost as a result of the floods during those two years, 28 during 1944, and 91 during 1945. Savings resulting from the flood forecasting and warning service were evaluated at about \$50,000,000.

Outstanding during 1944 was the extensive, destructive flooding in the Central States during April, May, and June, one year after the extraordinary floods of May 1943, in practically the same region. The greatest floods of record occurred in May in portions of the upper Neosho River, and the highest floods since 1903 occurred in the

lower Missouri. Record-high stages were approached in June in many streams and were exceeded in a few in the upper Mississippi River Basin in eastern Texas.

The major flood event of 1945 was that of the Ohio River in March. It ranked generally among the first four or five of the greatest floods of record in that river. The greatest flood of record in the upper Mohawk River Basin since 1918 occurred in October. Destructive flash floods also occurred in the small streams in the Lake Section of Rensselaer County and Columbia County, New York, on July 22d, as a result of intense thunderstorms.

¹ Flood loss statistics for 1942 and 1943 were published in the August 1945 issue of the Monthly Weather Review.

1944

River and drainage	Tangible property	Matured crops	Prospective crops	Livestock and other movable farm property	Suspension of business	Total	Lives lost
HUDSON BAY DRAINAGE							
Red River of the North.....	\$600				\$500	\$1,100	
ST. LAWRENCE DRAINAGE							
Mad and White Rivers (Wisconsin).....						¹ 28,800	
Maumee River.....	50,000		\$50,000			100,000	
Total.....	50,000		50,000			128,800	
SOUTH ATLANTIC SLOPE DRAINAGE							
James River.....	241,000	\$100,000		\$274,200	33,000	648,200	
Roanoke, Tar, Neuse, and Cape Fear Rivers.....	11,300	225,000	32,200		54,500	323,000	
Pee Dee River.....	7,700			1,500	21,000	30,200	
Saluda River.....	100			2,500		2,600	
Broad River.....	1,500		11,500	400	800	14,200	
Catawba-Waterlee Rivers.....	1,500		500	300	2,400	4,700	
Santee River.....	7,500				10,600	18,100	
Savannah and Ogeechee Rivers.....	3,000	100	1,000	26,800	52,900	83,800	
Altamaha River.....	546,800	78,000	101,700	22,200	53,000	801,700	
Total.....	820,400	403,100	146,900	327,900	228,200	1,926,500	
EAST GULF OF MEXICO DRAINAGE							
Apalachicola River.....	1,125,600	16,000	192,000	17,000	28,900	1,379,500	
Conecuh River.....	35,400	5,000	22,500	2,100	48,500	113,500	
Tallahpoosa River.....	20,000		20,000	25,000	5,000	70,000	
Cahaba River.....					1,000	1,000	
Alabama River.....	5,000	20,000	75,000		2,000	102,000	
Tombigbee River.....	469,200	6,000	227,800	25,800	149,400	878,200	
Chickasawhay River.....					500	500	
Pearl River.....	90,500		4,000	4,500	10,500	115,500	
Total.....	1,745,700	47,000	541,300	74,400	251,800	2,660,200	
MISSISSIPPI SYSTEM							
<i>Upper Mississippi Basin</i>							
Minnesota River.....	25,000		600,000	10,000	60,000	695,000	
St. Croix River.....			² 25,000			25,000	
Zumbro and Whitewater Rivers.....			40,000			40,000	
Buffalo and Trempealeau Rivers.....			6,000			6,000	
Root River.....			2,000			2,000	
Rock River.....	1,000			200	300	1,500	
Iowa River.....	125,000	5,000	200,000	50,000	20,000	400,000	
Skunk River.....	1,532,500	15,900	1,545,000	9,700	66,000	3,169,100	
Raccoon River.....	178,900	1,600	595,800	1,200	100	777,600	
Des Moines River.....	1,406,100	65,300	840,500	200,100	57,200	2,569,200	
Salt and Fox Rivers.....	3,000		11,500			14,500	
Illinois River.....	187,500		756,000		16,500	960,000	
Meramec River.....	103,100		178,000			281,100	
Kaskaskia River.....	81,400		1,037,800			1,119,200	
Mississippi River (above Cape Girardeau, Mo.).....	5,951,600	250,000	8,704,200	164,800	1,840,000	16,910,600	7
Total.....	9,595,100	337,800	14,601,800	436,000	2,060,100	27,030,800	7

See footnotes at end of table.

ESTIMATED FLOOD LOSSES FOR 1944 AND 1945—Continued

1944—Continued

River and drainage	Tangible property	Matured crops	Prospective crops	Livestock and other movable farm property	Suspension of business	Total	Lives lost
MISSISSIPPI SYSTEM—continued							
Missouri Basin							
Yellowstone River	\$89,100			\$5,000	\$7,700	\$101,800	
Little Missouri River	2,000					2,000	
Heart River	9,500					9,500	
Cannonball River						153,400	
Grand River (South Dakota)						1379,400	
Moreau River						162,300	
Cheyenne River						116,500	
Vermillion River	23,000		\$528,900			551,900	
Big Sioux River	23,000		254,600		5,600	283,200	
Aowa Creek (Nebraska)	136,800		81,900			218,700	
Perry Creek (Sioux City, Iowa)	1,037,100					1,037,100	
Floyd River	24,800	\$1,700	19,300	300		46,100	
Little Sioux River	91,800		676,800	100		768,700	
Boyer River	7,500		48,600			56,100	
Lodgepole Creek (Nebraska)	121,400		125,000			246,400	
Elkhorn River	4,766,400	1,300	3,751,000	633,500	9,500	9,161,700	2
Platte River	146,400		525,400			671,800	
Nishabotna River	45,000		652,600		5,000	703,500	1
Tekamah Creek (Nebraska)	132,300		507,300			639,600	1
Little Nemaha River	1,200		94,800			96,000	
Nodaway River (Missouri)	18,000		11,600	100		27,700	
Solomon River	18,100		258,100	2,200		278,400	
Smoky Hill River	9,000		31,000	500	5,000	45,500	
Big Blue River	540,500		1,131,900	300		1,672,700	
Republican River	199,900	1,474,400	20,000	1,600		1,700,900	
Kansas River	103,000	3,000	210,900	144,500	16,000	477,400	
Grand River (Missouri)	122,800		568,000	1,000	32,000	723,800	
Chariton River	17,900		85,000	900		103,800	1
Blackwater River (Missouri)	4,900		173,000			178,000	
Osage River	964,900	151,000	748,200	16,700	25,700	1,906,500	
Missouri River	12,452,600	26,100	9,651,900	71,600	107,100	22,395,300	8
Total	21,107,800	1,657,500	20,155,900	878,300	213,600	44,615,700	1
Ohio Basin							
Tygart River						13,800	
Little Kanawha River	2,000					2,000	
Scioto River						14,900	
White River	98,800		119,900	5,900	29,000	253,600	
Wabash River	14,500		224,800	3,200	11,600	254,100	
Cumberland River	1,100		300	800		2,200	
French Broad River						142,200	
Tennessee River and tributaries	122,900			1,800	36,000	160,700	
Ohio River	10,000	700	61,800	5,000	5,000	82,500	
Total	249,300	700	406,800	16,700	81,600	806,000	
White—Arkansas Basins							
White River		5,500	74,800		2,800	83,100	
Walnut River	29,000	17,500	20,000	7,500		74,000	5
Verdigris River	361,300	3,200	966,600	39,100	52,100	1,422,300	
Cottonwood River	221,000	530,000	429,500	18,000	6,000	1,204,500	
Neosho River	129,300	240,200	158,000	32,200	7,600	567,300	
North Canadian River	76,500		8,000	2,500		87,000	
South Canadian River	5,000	4,500	18,000			27,500	
Poteau River	500		3,500			4,000	
Arkansas River	350,000	60,700	181,900		108,800	701,400	5
Total	1,172,600	861,600	1,860,300	99,300	177,300	4,171,100	10
Red Basin							
Little River	20,000		230,000	1,500		251,500	
Sulphur River	82,400	11,000	140,300	5,400	442,100	681,200	
Cypress River	348,000	20,000	354,000	13,700	7,500	743,200	
Total	450,400	31,000	724,300	20,600	449,600	1,675,900	
Lower Mississippi Basin							
Yazoo and Black Rivers	100,000		1,430,000	20,000		1,550,000	
WEST GULF OF MEXICO DRAINAGE							
Sabine River	433,000	28,000	1,320,000	76,000	34,200	1,891,200	3
Neches River	75,000	280,300	750,000	80,000		1,185,300	
Trinity River	1,057,000	6,000	2,398,000	347,500	34,000	3,840,500	
Brazos River	753,300	22,000	1,018,500	5,100	4,500	1,803,400	
Pedernales River	15,000			5,100		20,100	
Guadalupe River	3,000	2,500		1,500		7,000	
Nueces River	3,000	2,500		200		5,700	
Rio Grande River	16,900		100,700			117,600	
Total	2,356,200	341,300	5,585,200	515,400	72,700	8,938,300	3
GULF OF CALIFORNIA DRAINAGE							
Gila River	405,000	155,000		5,000	10,000	575,000	
Grand Totals	38,053,100	3,835,000	45,502,500	2,393,600	3,545,400	94,079,400	33

1 Unclassified.

2 Includes all agricultural losses.

3 Includes losses of \$86,000 which were not classified.

4 Includes losses of \$5,000 which were not classified.

5 Includes all crop losses.

6 Includes losses of \$67,500 which were not classified.

ESTIMATED FLOOD LOSSES FOR 1944 AND 1945—Continued

1945

River and drainage	Tangible property	Matured crops	Prospective crops	Livestock and other movable farm property	Suspension of business	Total	Lives lost
HUDSON BAY DRAINAGE							
Red River of the North	\$18,300				\$500	\$18,800	
ST. LAWRENCE DRAINAGE							
<i>Lake Erie</i>							
Clinton River						1 100,000	
ATLANTIC SLOPE DRAINAGE							
Streams in Lake Section, Rensselaer County, New York							
Mohawk River	790,000	\$200,000			20,000	1 a, 500,000	3
Schuylkill River	25,000	100,000				1,010,000	
Brandywine Creek	35,000	700		\$1,000	25,000	125,000	
Delaware River	827,000				205,000	1,032,000	
James River		10,000			2,000	12,000	
Cape Fear, Tar, Neuse, and Roanoke Rivers	26,900	75,300	\$11,300	10,100	50,100	182,700	3
Pee Dee River	192,500	35,000	12,000	10,500	128,500	378,500	
Congaree River	30,000	38,000		3,900	7,000	78,900	
Catawba and Wateree Rivers	34,000	207,000		1,000	51,300	293,300	
Santee River	3,000	25,000			10,000	38,000	
Broad River	10,100	11,800			1,500	23,400	
Total	1,973,500	702,800	23,300	26,500	509,400	6,735,500	6
EAST GULF OF MEXICO DRAINAGE							
Apalachicola River			10,000		14,800	24,800	
Cahaba River			3,000		500	3,500	
Tombigbee River	10,300			6,500	33,200	50,000	
Pearl River	45,000	10,000	70,000	20,200	44,000	189,200	
Total	55,300	10,000	83,000	26,700	92,500	267,500	
MISSISSIPPI SYSTEM							
<i>Upper Mississippi Basin</i>							
Tributaries of Mississippi River in Wisconsin							
Rock River	162,700	21,500	131,500	3,700	16,900	336,300	
Skunk River	50,000		12,500	5,000		135,000	
Raccoon River	500				500	1,000	
Des Moines River	14,000		5,600		1,000	20,600	
Illinois River	42,000	2,500	30,500	3,000	9,000	87,000	
Meramec River	37,500	80,500	880,900	10,800	5,000	714,700	
Mississippi River (above Cape Girardeau, Mo.)	1,590,500	252,000	270,500	7,000		2,120,000	
	920,900	456,800	3,770,000	78,100	648,000	5,873,800	
Total	2,818,100	813,300	4,801,500	107,600	680,400	9,288,400	
<i>Missouri Basin</i>							
Clark Fork	17,500					17,500	
Big Horn River	18,000					18,000	
Tongue River	1,000		1,200			2,200	
Powder River	2,500					2,500	
Yellowstone River	28,500					28,500	
Knife River	9,600				5,000	14,600	
Square Butte Creek	7,000					7,000	
Heart River	103,600		10,000		3,300	116,900	
Big Sioux River and North Creek	20,200		24,200		85,500	129,900	
Floyd River and streams in Sioux City area	16,000				600	16,600	
Oak Creek	35,700		100,000	7,000	3,700	146,400	
Platte River in Missouri	764,000		1,304,100	1,700	2,000	2,131,800	
Solomon and Saline Rivers	244,600		784,500	6,000	13,200	1,048,300	
Smoky Hill River	156,600		1,389,800	1,800		1,548,200	
Nemaha River	68,400		507,800	4,600	3,300	584,100	
Republican River	107,100	10,000	1,580,300	3,000	1,300	1,701,700	
Kansas River	1,308,000	12,500	7,244,900	64,100	185,600	8,815,100	
Grand River	727,000		5,764,000	3,800	30,100	6,524,900	
Chariton River	161,500		1,254,600	700	900	1,417,700	
Osage River	485,300	315,000	1,356,400	165,000	88,500	2,410,200	
Gasconade River	605,300		526,900	135,100	135,000	1,402,300	4
Minor tributaries of Missouri River	782,000	75,200	2,693,100	171,700	173,600	3,895,600	
Missouri River	463,500		1,944,000	5,200	9,800	2,422,500	
Total	6,132,900	412,700	26,545,800	569,700	741,400	34,402,500	4
<i>Ohio Basin</i>							
Allegheny River	46,300				24,100	1 a, 414,800	
Monongahela River	277,000				121,700	398,700	
New River	11,000	34,000	1,300	200		46,500	
Scioto River	19,500	1,000	50,000		10,000	80,500	
Little Miami River	73,000	5,000	2,500	4,500	27,600	112,600	
Licking River	2,000	300			1,700	4,000	
Kentucky River	51,000				28,600	79,600	
White River	1,000		2,000		2,700	1 b, 798,700	
Wabash River			140,000			1 b, 794,000	2
Cumberland River	39,700	10,000	5,000	1,500	8,500	64,700	
Ohio River	5,683,100	54,200	132,200	50,000	4,703,000	13,993,000	25
Total	6,203,600	104,500	333,000	56,200	4,927,900	52,887,100	27
<i>White Basin</i>							
White River	243,500	100,300	933,000	57,500	137,500	1,471,800	

See footnotes at end of table.

ESTIMATED FLOOD LOSSES FOR 1944 AND 1945—Continued

1945—Continued

River and drainage	Tangible property	Matured crops	Prospective crops	Livestock and other movable farm property	Suspension of business	Total	Lives lost
MISSISSIPPI—continued							
<i>Arkansas Basin</i>							
Cimarron River.....	\$8,000	\$1,000	\$18,000	\$1,500		\$26,500	
Verdigris River.....	333,000	115,500	615,900	45,000	\$21,500	1,130,900	
Cottonwood River.....	70,000	33,000	112,000	7,000	35,000	257,000	
Neosho River.....	524,300	34,700	629,500	44,200	35,100	1,267,800	
Canadian River.....	3,118,900	193,500	1,368,900	171,500	73,100	4,925,900	19
Poteau River.....	800	1,200	1,100			3,100	
Arkansas River.....	3,528,000	578,500	1,399,400	47,500	432,300	5,985,700	1
Total.....	7,581,000	957,400	4,144,800	316,700	597,000	13,596,900	20
<i>Red Basin</i>							
Ouachita River in Arkansas.....	1,222,500	69,500	395,200	445,100	179,300	2,311,600	
Black, Ouachita in Louisiana and Atchafalaya Rivers; Red River below Alexandria, La.; Mississippi River below Natchez, Miss.	1,960,100	1,090,300	4,285,600	740,300	782,500	8,858,800	
Red River above Alexandria, La.....	3,760,000	5,653,000		782,600	82,800	11,038,800	6
Total.....	6,942,600	6,812,800	4,680,800	1,968,000	1,044,600	22,209,200	6
<i>Lower Mississippi Basin</i>							
Wolf River.....	500	1,000		300		1,800	
St. Francis River.....	35,000	15,000	465,000	1,000	45,000	561,000	
Yazoo River.....	155,000		1,000,000	25,000	55,000	1,235,000	
Mississippi River from Natchez, Miss., to Cape Girardeau, Mo.....	329,100	60,600	1,319,800	30,200	63,800	1,803,500	
Total.....	519,600	76,600	2,784,800	56,500	163,800	3,601,300	
WEST GULF OF MEXICO DRAINAGE							
Sabine River.....	2,006,500	13,000	251,500	221,500	423,800	2,916,300	
Trinity River.....	1,556,900	322,500	5,193,700	183,500	219,500	7,476,100	4
Brazos River.....	105,000	106,300	337,500	15,000	11,500	575,300	
Guadalupe River.....	1,500		16,000	900		18,400	
Rio Grande River.....			500			500	
Total.....	3,669,900	441,800	5,799,200	420,900	654,800	10,986,000	4
GULF OF CALIFORNIA DRAINAGE							
<i>Colorado Basin</i>							
Gila River.....	176,000			500	5,000	181,500	10
GREAT BASIN DRAINAGE							
Great Basin Drainage.....	400,000					400,000	
PACIFIC SLOPE DRAINAGE							
Tehachapi River.....						62,500	3
Tule, Fresno, Kings, Kaweah Rivers and Tulare Lake.....	1,323,400		1,105,100			2,428,500	
San Joaquin River.....		8,500				8,500	
Sacramento River.....	55,500	2,000	50,000	200	11,500	117,500	
Eel River.....						12,500	
Klamath, Rogue, and Umpqua Rivers.....	77,800		200,000	500		278,300	2
Willamette River.....						6,000,000	9
Total.....	1,456,700	10,500	1,355,100	700	11,500	9,530,400	14
Grand Totals.....	38,191,000	10,442,700	51,484,300	3,607,500	9,566,300	165,796,900	91

¹ Unclassified.² Includes losses of \$67,500 which were not classified.³ Includes losses of \$344,400 which were not classified.⁴ Includes losses of \$5,793,000 which were not classified.⁵ Includes losses of \$6,654,000 which were not classified.⁶ Includes losses of \$28,470,000 which were not classified.⁷ Includes losses of \$760,400 which were not classified.⁸ Includes losses of \$120,000 which were not classified but resulting mostly to crops.⁹ Includes losses of \$358,200 which were not classified.¹⁰ Includes losses of \$262,700 which were not classified.

CLIMATOLOGICAL DATA FOR JUNE 1948

CONDENSED CLIMATOLOGICAL SUMMARY OF TEMPERATURE AND PRECIPITATION, BY SECTIONS

[For description of tables and charts, see REVIEW, January 1943, p. 15]

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and

lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Section	Temperature								Precipitation							
	Section average	Departure from the normal	Monthly extremes						Section average	Departure from the normal	Greatest monthly		Least monthly			
			Station	Highest	Date	Station	Lowest	Date			Station	Amount	Station	Amount		
	° F.	° F.		° F.				° F.		In.	In.		In.		In.	
Alabama	79.5	+1.2	2 stations	102	14	Valley Head	50	4	3.58	-0.67	Wallace	8.40	Mobile	1.53		
Arizona	74.8	-1.4	do	116	29	Fort Valley	22	3	3.26	-0.08	Pinedale	1.48	14 stations	.00		
Arkansas	77.8	+7.7	Eldorado	102	15	2 stations	45	11	4.91	+81	Walnut Grove	12.55	Magnolia	.87		
California	66.7	-1.2	Cow Creek	122	30	3 stations	22	5	4.48	+15	Tulelake (near)	3.72	40 stations	.00		
Colorado	61.5	-1.1	Fort Lupton	106	16	Dillon	21	9	2.30	+86	Idalia	8.17	Olathe	.30		
Florida	81.0	+1.1	Palatka	102	25	2 stations	53	3	3.80	-2.97	Naples	11.50	Key West	.90		
Georgia	78.8	+6.2	2 stations	103	25	Blairsville	45	2	2.95	-1.45	Clayton	3.27	Fort Valley	.33		
Idaho	62.4	+2.3	do	103	29	2 stations	27	16	2.38	+95	Burke, 2 NNE	5.48	Richfield	.03		
Illinois	71.8	-3.1	Alton Dam	100	5	Waukegan	39	20	3.78	-24	Monticello	8.26	Illinois City Dam	1.26		
Indiana	71.8	+2.2	Seymour	97	22	Huntington	40	1	4.39	+46	Logansport	8.96	Evans Landing	1.17		
Iowa	68.6	-1.1	Missouri Valley	97	9	Marshalltown	31	11	3.45	-1.11	Waterloo	6.98	Knoville	1.23		
Kansas	73.6	-2.4	4 stations	108	17	Burr Oak	45	9	6.57	+2.49	Pittsburg	17.38	Deerfield	2.25		
Kentucky	74.3	+4.4	St. John	106	22	Farmers	37	1	3.27	-90	Hopkinsville, 2 E	8.21	Louisville	1.15		
Louisiana	81.6	+1.5	3 stations	102	20	Pollock	48	2	2.67	-2.65	Abita Springs	7.01	Camp Polk	.62		
Maryland-Delaware	71.4	+5.5	Coleman, Md.	98	24	2 stations, Md.	36	6	5.21	+1.21	Baltimore, Md.	9.36	Solomons, Md.	2.12		
Michigan	63.0	-1.3	Mt. Pleasant	95	3	Grand Marais	26	6	3.36	-21	Grayling	7.31	Eagle Harbor	1.58		
Minnesota	63.7	-1.0	Argyle	96	2	Meadowlands	29	6	3.92	-24	Ah-gwah-ching	6.43	Grand Marais	1.45		
Mississippi	80.3	+1.4	Houston	102	19	Vicksburg Airport	48	2	3.10	-1.02	Holcomb	7.11	Waynesboro	.28		
Missouri	73.3	-3.3	Brookfield	100	11	5 stations	42	11	7.43	+2.61	Concordia	17.29	Canton	1.60		
Montana	60.8	+1.2	Hysham	101	30	3 stations	30	17	3.90	+1.36	Valier	11.24	Wolf Point	1.13		
Nebraska	68.5	-7.7	Newport	101	9	Broken Bow	41	19	4.65	+90	Fullerton	9.76	Henry	.40		
Nevada	64.3	-1.1	Las Vegas Airport	112	30	Fish Creek Ranch	26	11	1.05	+52	Jarbridge	3.27	2 stations	.00		
New England	61.4	-2.6	Framingham, Mass.	97	30	Mt. Washington, N. H.	24	5	4.12	+57	Pittsfield, Mass.	10.32	Jackman, Maine	.63		
New Jersey	68.6	-5.5	2 stations	98	29	Layton	35	6	5.28	+1.45	Essex Falls	11.56	Berlin	2.79		
New Mexico	69.5	+1.9	do	100	16	Red River	25	5	1.95	+71	Long Canyon	9.28	Hachita	.00		
New York	63.7	-1.4	Poughkeepsie	98	29	Lake Placid Club	29	6	4.12	+45	Mount Lebanon	11.10	Adams Center	1.03		
North Carolina	74.2	+1.1	Greenville	103	27	Banner Elk	37	2	3.52	-1.09	Banner Elk	7.07	Manteo	.70		
North Dakota	62.4	-4.4	Oakes	101	2	Bowbells	30	18	3.12	-40	Grand Forks	7.64	Powers Lake	.77		
Ohio	70.1	+4.4	Wilmington	97	22	Millport, 2 NW	34	11	4.20	+24	Willoughby, 4 N	7.44	Delaware	1.94		
Oklahoma	78.2	+1.0	3 stations	110	17	Wilburton	42	2	6.69	+2.70	Okmulgee	15.79	Mangum	.77		
Oregon	61.4	+2.0	do	105	29	2 stations	25	21	1.93	+59	Fossil	6.59	Crescent Lake	.06		
Pennsylvania	67.4	-7.7	Pultneyville Dam	100	27	Coalport	29	6	5.15	+99	Ebensburg	9.61	Ringtown, 1 SW	2.20		
South Carolina	78.1	+4.4	Camden	103	26	3 stations	50	12	2.96	-1.69	Dillon	7.18	Little Mountain	.66		
South Dakota	64.3	-1.8	Gregory	100	9	Deadwood	33	19	5.11	+1.52	Bridgewater	10.07	Camp Crook	2.50		
Tennessee	75.7	+8.3	3 stations	100	21	3 stations	43	11	3.18	-94	Covington	7.15	Lewisburg	1.13		
Texas	82.4	+2.2	Presidio	114	18	Throckmorton	47	5	2.44	-55	Loma Alto	12.20	9 stations	.00		
Utah	64.0	-3.3	Zion National Park	104	30	2 stations	29	20	1.66	+95	Rice Canyon	5.29	Wendover	.02		
Virginia	72.0	+1.1	5 stations	100	24	Sugar Grove	38	2	4.10	-05	Glen Lyn	8.35	Fredericksburg	1.19		
Washington	63.2	+2.7	Richland	107	29	Mt. Baker Lodge	29	16	2.52	+81	Cedar Lake	6.75	Port Angeles	.44		
West Virginia	69.8	0	Brownsville	101	23	Canaan Valley	33	17	4.88	+42	Morgantown	8.10	Hamlin	2.10		
Wisconsin	66.9	+1.9	Superior	94	13	Land O'Lakes	25	15	3.02	-1.18	Appleton	6.04	Oconomowoc	1.47		
Wyoming	60.4	+1.9	Basin	99	30	Sage	25	26	2.62	+85	Clarkston	7.99	Basin	.72		
Alaska (May)	39.6	-1.9	Circle Hot Springs	78	16	Wainwright	-16	3	1.13	-48	Whittier	15.68	3 stations	T		
Hawaii	79.3	+1.3	2 stations	96	13	Garzas	56	24	6.14	-08	Naguabo	16.53	Santa Rita	.97		
Puerto Rico																

¹ Other dates also.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS FOR JUNE 1948

District and station	Elevation of instruments			Pressure		Temperature of the air										Precipitation										Wind				Character of day (sunrise to sunset) number of days																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	Barometer above sea level	Thermometer above ground	Anemometer above ground	Station	Sea level	Departure from normal	Averages				Extremes				Total heating degree days	Mean temperature of the dew point	Mean relative humidity	Precipitation				Wind				Average cloudiness, tenths (sunrise to sunset)	Possible sunshine																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
							Mean maximum	Mean minimum	Mean	Departure from normal	Highest	Date	Lowest	Date				Greatest daily range	Total	Departure from normal	Greatest in 24 hours	Days with 0.01 inch or more	Days with thunderstorms	Total snow (all unmelted)	Snow, sleet, and ice on ground at end of month			Average hourly speed	Prevailing direction	Miles per hour	Direction	Date	Clear	Partly cloudy	Cloudy																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS FOR JUNE 1948—Continued

District and station	Elevation of instruments			Pressure		Temperature of the air								Total heating degree days	Precipitation		Wind				Character of day (sunrise to sunset) number of days				sun- rise to set													
	Barometer level	Thermometer above ground	Anemometer above ground	Station	Sea level	Averages				Extremes					Total	Departure from normal	Greatest in 24 hours	Days with 0.01 inch or more	Days with thunder- storms	Total snow/fall (un- melted)	Snow, sleet, and ice on ground at end of month	Average hourly speed	Prevailing direction	Maximum velocity		Clear	Partly cloudy	Cloudy	Average cloudiness, tenths (sunrise to sunset)	Possible sunshine								
						Mean	Minimum	Maximum	Departure from normal	Highest	Date	Lowest	Date											Greatest daily range							Miles per hour	Direction	Date	Clear	Partly cloudy	Cloudy	Average cloudiness, tenths (sunrise to sunset)	Possible sunshine
West Gulf—Continued																																						
Dallas ¹	488	34	45	994.61	1,012.5	0	94	72	83.0	+2.6	103	5	58	3	30	0	67	64	5.82	+1.9	2.93	6	7	0	0	12.3	s.	37	w.	29	8	16	9	5	4.0	69		
Fort Worth ¹	706	40	56	988.8	1,012.5	0	94	72	82.8	+2.9	102	5	59	2	35	0	64	60	2.46	-.9	1.13	6	6	0	0	12.3	s.	32	n.	8	17	8	5	4.0	86			
Galveston ¹	54	122	129	1,012.9	1,014.6	+4.4	86	78	82.2	+1.5	88	25	70	2	15	0	74	81	4.46	-.9	1.19	4	4	0	0	12.6	s.	30	s.	21	14	14	2	3.8	83			
Houston ¹	138	157	190	1,009.1	1,013.9	0	92	74	83.2	+1.8	97	10	64	3	28	0	70	76	1.84	-2.7	1.12	4	4	0	0	10.3	s.	30	se.	30	15	13	2	3.8	86			
Laredo ¹	418	10	38	996.3	1,010.8	0	90	76	87.6	+2.2	105	10	69	3	29	0	67	60	2.84	-1.1	.61	4	4	0	0	10.3	se.	25	nw.	16	7	4	3	4.3	81			
Palestine ¹	510	64	72	996.6	1,014.2	+3.3	91	72	81.4	+2.4	95	18	61	2	26	0	67	66	2.64	-1.0	2.36	4	7	0	0	7.9	s.	29	s.	22	14	13	3	3.9	83			
Port Arthur ¹	34	59	134	1,013.2	1,014.2	0	89	76	82.6	+1.6	94	13	64	2	25	0	71	78	2.08	-2.7	.88	4	7	0	0	12.6	s.	29	sw.	28	11	9	10	5.1	60			
San Antonio ¹	794	6	51	988.5	1,012.5	0	97	72	84.4	+3.4	102	18	61	3	35	0	66	63	2.96	+.5	1.91	7	8	0	0	10.6	s.	29	sw.	28	11	9	10	5.1	60			
Ohio Valley and Tennessee																																						
Chattanooga ¹	762	6	66	987.8	1,014.6	-6	90	65	77.5	+1.8	97	26	54	3	34	0	64	67	3.79	-1.3	1.18	12	13	0	0	7.1	s.	34	w.	29	8	16	6	5.0	60			
Knoxville ¹	955	27	71	980.7	1,015.6	+4	88	65	76.1	+2.3	97	28	52	2	36	0	63	67	3.47	-.6	.96	16	15	0	0	7.6	sw.	43	w.	24	7	13	10	5.7	54			
Memphis ¹	399	5	49	1,000.4	1,013.9	-7	90	67	78.8	+2.4	96	13	52	2	37	0	65	68	5.06	+1.5	1.88	12	16	0	0	7.4	sw.	34	w.	16	9	14	7	5.0	82			
Nashville ¹	546	5	72	994.9	1,014.2	-1.4	91	67	78.8	+3.2	96	28	52	2	37	0	63	63	1.64	-2.4	.48	10	12	0	0	8.7	sw.	36	nw.	25	9	14	7	4.9	73			
Lexington ¹	969	4	58	979.7	1,014.9	-1.0	86	62	73.7	+1.5	93	28	46	1	31	0	60	64	2.03	-1.8	.62	10	7	0	0	7.4	s.	38	sw.	28	4	14	12	6.6	82			
Louisville ¹	525	5	54	997.0	1,013.9	-1.3	88	63	75.2	+1.7	96	23	47	1	36	0	62	68	1.85	-2.2	.99	8	9	0	0	7.4	sw.	37	s.	20	7	13	10	5.9	70			
Evansville ¹	431	6	40	998.6	1,013.9	-1.0	87	62	74.4	+2.5	94	23	48	1	36	4	59	68	4.24	-.26	1.34	12	8	0	0	9.6	sw.	45	nw.	21	3	16	11	6.5	71			
Indianapolis ¹	823	5	54	984.1	1,013.5	-1.1	83	60	71.3	+1.4	92	23	47	1	36	1	60	69	3.26	-.7	.64	13	10	0	0	8.8	s.	34	nw.	12	6	11	13	6.2	67			
Terre Haute ¹	575	4	36	993.2	1,013.9	-0	85	60	72.2	+1.5	93	23	52	1	31	1	60	69	4.01	+.4	1.33	12	9	0	0	4.3	nw.	17	nw.	12	5	15	10	8.7	78			
Cincinnati ¹	627	135	148	991.9	1,014.6	-3	86	64	75.0	+3.8	96	23	50	1	30	3	59	69	3.94	+.6	1.36	13	11	0	0	8.9	n.	36	sw.	29	10	11	9	5.2	72			
Columbus ¹	822	90	110	984.4	1,013.5	-1.4	83	62	72.4	+1.5	92	23	49	1	32	12	58	68	5.48	+.7	1.93	17	12	0	0	10.3	sw.	45	w.	26	8	14	8	5.7	71			
Dayton ¹	1,003	6	55	978.3	1,013.9	-3	81	60	70.6	+.8	92	23	48	2	33	49	59	82	6.00	+.9	1.85	18	11	0	0	5.8	nw.	39	w.	24	0	16	14	7.3	64			
Elkins ¹	1,947	5	45	946.8	1,014.6	-1.0	78	55	66.4	+.8	94	23	43	1	35	8	61	76	4.66	+.7	1.06	15	12	0	0	5.8	nw.	26	nw.	8	2	15	13	6.8	59			
Parkersburg ¹	637	77	84	982.7	1,013.5	-1.4	80	61	72.2	+.8	94	23	43	1	35	11	58	72	6.05	+.2	2.33	15	15	0	0	8.8	s.	36	sw.	29	4	14	12	6.3	52			
Pittsburgh ¹	842	39	54	983.4	1,013.5	-1.4	80	60	70.0	+.4	90	29	50	1	28	11	58	72	6.05	+.2	2.33	15	15	0	0	8.8	s.	36	sw.	29	4	14	12	6.3	52			
Lower Lakes																																						
Buffalo ¹	768	34	96	985.4	1,012.9	-1.3	75	55	65.2	+.5	89	29	41	6	35	71	56	76	3.07	+.3	.78	13	3	0	0	11.4	sw.	45	sw.	29	5	14	11	5.9	68			
Canton	448	10	61	995.0	1,011.5	-1.4	73	52	62.8	-.7	87	29	35	6	36	122	53	71	2.80	-.8	1.04	13	5	0	0	6.7	w.	22	w.	29	5	10	15	6.7	58			
Oswego	335	71	85	1,000.0	1,012.2	-1.3	71	55	62.8	-.1	92	29	45	6	26	129	54	74	2.54	-.7	.79	15	6	0	0	6.6	w.	24	n.	5	8	14	8	5.6	61			
Rochester ¹	523	4	69	993.9	1,012.9	-1.3	76	54	65.3	+.2	93	29	40	6	34	75	55	70	2.76	-.2	.89	15	2	0	0	8.4	sw.	33	sw.	24	5	16	9	5.6	71			
Syracuse ¹	596	5	57	991.5	1,012.9	-1.3	78	54	65.8	+1.3	93	29	42	6	39	66	56	70	3.89	0	.112	12	5	0	0	7.8	sw.	26	s.	29	4	15	11	6.7	67			
Erie ¹	714	57	81	987.8	1,013.2	-1.0	74	59	66.6	+.3	92	23	48	6	23	54	56	74	6.12	+.2	1.12	11	8	0	0	6.8	w.	25	sw.	29	6	15	9	5.7	67			
Cleveland ¹	762	27	54	986.1	1,013.2	-1.4	80	57	68.3	+.6	94	23	41	1	38	40	57	71	3.95	+.8	.73	15	7	0	0	8.8	s.	34	sw.	29	7	11	12	5.9	66			
Sandusky	629	5	67	990.9	1,013.5	-1.4	78	60	68.8	0	95	23	47	6	29	28	58	71	3.84	+.4	1.12	16	8	0	0	7.4	w.	30	sw.	28	8	12	10	5.8	66			
Toledo ¹	628	5	67	990.5	1,013.5	-1.1	78	58	68.0	+.8	94	23	44	6	34	34	57	72	4.42	+.1	1.94	14	6	0	0	9.0	sw.	34	sw.	28	6	13	13	6.7	63			
Fort Wayne ¹	857	5	34	982.7	1,013.2	-1.4	80	59	69.0	+1.6	92	23	45	16	34	20	58	71	4.53	+1.0	1.10	15	10	0	0	7.8	sw.	52	se.	22	4	13	13	6.7	63			
Detroit ¹	730	5	77	987.5	1,013.9	-.7	77	57	67.3	+1.1	91	23	43	6	32	52	55	68	2.79	-.8	.70	16	7	0	0	8.3	w.	26	n.	4	4	10	16	6.9	52			
Upper Lakes																																						
Alpena	609	5	89	990.9	1,013.2	-1.0	72	52	61.9	+1.5	90	23	42	16	35	127	51	69	1.75	-.1	6.50	10	1	0	0	8.7	nw.	25	e.	8	7	11	12	6.2	59			
Escanaba	612	51	72	990.9	1,013.2	-.6	69	52	60.2	-.5	81	23	38	6	33	161	80	72	3.13	-.1	1.00	10	1	0	0	9.2	n.	35	nw.	24	5	12	10	5.9	55			
Grand Rapids ¹	707	70	244	987.8	1,013.2	-.7	77	57	67.2	-.6	89	22	46	16	32	45	54	71	2.62	-.9	.65	12	4	0	0	9.4	sw.	34	s.	22	4	10	16	6.5	65			
Lansing ¹	878	5	90	982.1	1,013.5	-.4	75	55	64.8	-1.0	86	23	42	6	33	84	55	70	4.44	+.9	1.88	15	4	0	0	9.4	sw.	33	sw.	28	6	11	13	6.4	48			
Marquette	734	44	73	986.5	1,013.5	-.4	68	50	59.0	+.1	86	23	39	6	28	220	48	70	3.40	+.2	2.07	14	1	0	0	6.5	n.	24	sw.	23	5	13	12	6.3	66			
Sault Sainte Marie ¹	614	10	52	990.5	1,012.9	-1.0	71	45	58.0	+.5	88	3	35	6	40	223	48	72	2.35	-.4	1.31	7	2	0	0	9.7	w.	39	sw.	23	7	10	13	6.2	63			
Chicago ¹	673	5	38	989.2	1,013.5	-1.0	78	58	67.6	+.5	91	4	48	20	30	55	56	68	3.21	-.3	.82	12	5	0	0	7.7	sw.	34	nw.	7	7	9	14	6.5	57			
Green Bay	617	5	32	990.9	1,013.5	+.3	75	54	64.6	-.3	91	3	41	16	39	79	52	67	2.67	-1.0	.60	12	5	0	0	7.0	se.	28	se.	7	7	10	13	6.1	64			
Milwaukee ¹	681	33	66	988.8	1,013.5	+.4	74	54	64.4	+2.3	90	4	43	20	40	107	53	69	3.19	-.2	2.19	13	3	0	0	10.7	w.	36	nw.	7	6	10	14	6.3	53			
Duluth ¹	1,133	5	47	972.6	1,013.9	+.7	70	50	59.9																													

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS FOR JUNE 1948—Continued

District and station	Elevation of instruments			Pressure		Temperature of the air								Precipitation						Wind				Character of day (sunrise to sunset) number of days											
	Barometer above sea level	Thermometer above ground	Anemometer above ground	Station	Sea level	Departure from normal	Averages				Extremes				Total heating degree days	Mean temperature of the dew point	Mean relative humidity	Total	Departure from normal		Greatest in 24 hours	Days with 0.01 inch or more	Days with thunderstorms	Total snowfall (unmelted)	Snow, sleet, and ice on ground at end of month	Average hourly speed	Prevailing direction	Maximum velocity		Date	Clear	Partly cloudy	Cloudy	Average cloudiness, tenths (sunrise to sunset)	Possible sunshine
							Mean maximum	Mean minimum	Mean	Departure from normal	Highest	Lowest	Date	Greatest daily range					Miles per hour	Direction															
MISSOURI VALLEY	ft.	ft.	ft.	Mo.	Mo.	Mo.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	In.	In.	In.	In.	In.	m. p.h.														
Columbia, Mo. ⁴	784	6	66	985.1	1,012.9	-3	84	63	73.7	+1.2	96	11	51	1	35	0	63	72	6.71	+2.0	1.84	17	14	0	0	6.3	s.	26	n.	17	10	10	10	5.5	58
Kansas City ¹	963	38	76	985.8	1,012.2	-3	85	65	74.8	+1.2	98	10	55	1	33	1	61	70	7.01	+2.1	1.55	11	12	0	0	9.6	w.	31	e.	15	7	11	12	6.1	62
St. Joseph ²	967	5	51	978.3	1,012.2	-3	84	62	73.3	-4	95	10	52	1	34	2	61	70	7.01	+2.1	1.55	11	12	0	0	7.1	s.	41	sw.	22	10	9	11	5.8	59
Springfield, Mo. ³	1,324	5	50	967.2	1,013.5	-7	83	63	72.8	+1.1	94	11	54	9	33	0	62	74	10.96	+6.3	2.91	15	16	0	0	10.7	s.	35	ne.	17	7	8	15	6.3	70
Topeka ⁴	1,987	65	87	977.7	1,012.5	0	86	63	74.7	+1.3	98	11	56	19	35	2	62	72	5.28	+6.1	1.52	11	10	0	0	8.0	s.	29	nw.	6	9	7	14	6.2	71
Lincoln ⁴	1,180	6	81	970.5	1,012.5	+1.7	83	62	72.1	+7	92	4	53	9	39	2	56	69	3.21	-1.1	0.94	14	12	0	0	8.1	n.	34	e.	17	9	5	16	6.2	68
Norfolk, Nebr. ¹	1,551	5	38	958.7	1,013.5	0	80	58	69.0	-8	95	9	48	19	46	29	56	70	4.34	-4.1	1.06	13	11	0	0	6.0	n.	35	n.	10	7	13	5.7	71	
Omaha ¹	1,105	5	68	973.9	1,012.9	+4	83	61	70.7	+1.2	93	4	52	9	39	3	57	64	2.21	-2.4	1.75	17	9	0	0	9.7	n.	38	n.	12	9	5	16	6.2	68
Valentine ²	2,598	46	54	923.5	1,014.2	+1.7	77	55	65.8	-1.1	95	9	43	19	40	61	54	73	5.64	+2.8	1.94	17	13	0	0	8.3	n.	32	nw.	9	7	9	14	6.2	68
Huron ²	1,301	5	41	967.5	1,013.9	+1.4	76	55	65.2	-1.0	92	9	42	19	41	61	56	77	6.20	+2.4	3.10	12	6	0	0	9.6	nw.	25	s.	1	6	7	17	7.0	56
NORTHERN SLOPE																																			
Billings ²	3,570	16	39	891.3	1,013.5	+6	75	53	64.0	+9	98	30	44	18	36	94	52	68	1.66	+3.1	1.55	13	12	0	0	9.8	ne	38	nw.	13	3	9	18	7.2	53
Butte ²	5,533	44	58	831.0	1,016.6	0	69	45	56.8	+1.1	86	29	38	26	41	264	44	70	5.40	+3.1	1.66	21	16	0	0	9.0	nw.	33	sw.	3	5	22	7.7	53	
Glasgow ²	2,086	34	53	941.4	1,015.2	0	76	53	64.2	+2	94	30	39	18	39	93	52	68	3.44	+5.1	1.89	15	9	0	0	9.0	e.	42	w.	1	3	6	21	7.3	59
Great Falls ²	3,657	16	75	889.6	1,015.2	0	70	52	61.3	-1.1	89	8	45	18	30	158	50	73	4.44	+1.7	1.65	16	10	0	0	9.6	sw.	42	w.	1	5	6	19	7.6	59
Havre ²	2,507	11	67	927.2	1,015.6	+3.4	74	52	63.3	+1.3	94	8	40	18	34	112	50	67	2.56	-3.1	1.07	15	8	0	0	7.5	e.	23	e.	17	2	8	20	7.6	69
Helena ²	4,124	5	43	874.7	1,015.2	+2.3	70	51	60.8	+1.6	88	30	44	12	34	153	50	71	3.40	+1.4	1.20	18	11	0	0	7.5	w.	40	w.	30	5	5	20	7.2	45
Missoula ²	3,263	4	32	902.1	1,015.2	+1.0	74	50	62.0	+2.4	92	29	44	27	42	111	51	72	3.36	+1.4	0.97	17	11	0	0	6.1	nw.	31	n.	9	4	5	21	7.3	45
Kalispell ²	2,973	48	56	912.0	1,013.5	+6	72	52	61.8	+1.1	89	8	44	18	34	128	51	70	2.76	+7	0.94	15	8	0	0	5.4	w.	17	ne.	15	4	13	13	6.5	63
Miles City ²	2,371	5	28	930.9	1,013.9	+1.4	76	54	65.0	0	96	1	45	18	40	82	52	69	4.91	+1.5	1.51	13	15	0	0	6.1	ne.	31	n.	5	11	16	7.3	56	
Rapid City ²	3,259	5	56	901.8	1,014.2	+1.3	73	52	62.7	-1.5	90	9	41	19	37	114	53	75	4.86	+1.8	1.09	17	17	0	0	11.9	nw.	38	e.	17	8	3	19	7.0	56
Cheyenne ²	6,094	22	40	814.1	1,012.5	+1.0	73	48	60.6	+2	86	6	42	19	39	154	45	64	3.08	+1.5	1.04	13	12	0	0	9.7	nw.	33	w.	17	7	11	12	6.1	56
Lander ²	5,352	6	30	835.8	1,012.5	+1.0	77	50	63.4	+2.9	90	30	42	4	38	106	42	54	2.01	+9	1.60	6	16	0	0	7.4	sw.	39	sw.	2	8	15	7	5.5	65
Sheridan ²	3,790	5	38	870.0	1,012.5	+1.0	75	51	63.0	+1.5	94	30	43	21	42	101	50	70	4.59	+2.6	1.79	17	18	0	0	8.0	nw.	46	w.	1	3	11	16	6.0	53
North Platte ⁴	2,821	11	51	915.3	1,012.9	+7	79	57	68.0	+5	94	30	49	19	41	36	56	74	2.28	-9	0.70	15	16	0	0	6.3	n.	23	s.	2	5	16	6.5	55	
MIDDLE SLOPE																																			
Denver ⁴	5,292	106	113	838.5	1,011.9	+4	78	56	67.2	+9	92	17	46	23	31	57	46	57	2.05	+7	0.69	13	15	0	0	7.4	s.	30	se.	10	9	13	8	5.3	72
Pueblo ²	4,690	5	36	856.8	1,011.9	+1.4	84	54	69.0	+4	96	17	47	23	42	22	50	59	2.44	+1.1	1.25	7	9	0	0	7.8	nw.	45	nw.	11	13	10	7	4.7	73
Concordia ²	1,392	50	58	963.8	1,012.5	+3	83	62	72.6	-4	93	16	55	19	32	3	60	68	5.65	+1.2	2.59	11	12	0	0	7.7	sw.	27	nw.	26	12	13	5	4.8	67
Dodge City ²	2,509	5	58	925.5	1,011.2	-7	86	61	73.6	+1.1	104	17	52	19	36	7	58	65	4.40	+1.1	2.17	14	14	0	0	14.0	sw.	45	nw.	27	10	14	6	4.9	61
Wichita ²	1,358	52	64	964.4	1,011.9	0	87	64	75.2	+8	104	17	57	19	37	1	61	68	9.76	+5.4	2.29	14	15	0	0	12.8	s.	44	n.	15	7	10	13	6.0	58
Oklahoma City ⁴	1,214	10	47	969.9	1,011.9	-3	89	68	78.6	+2.6	100	18	63	2	27	0	66	70	9.42	+5.8	4.37	11	7	0	0	8.3	s.	26	s.	20	10	14	6	4.6	74
Tulsa ²	674	10	60	988.5	1,012.2	0	88	66	77.2	+7	96	8	55	3	31	0	64	70	11.17	+6.7	4.37	7	7	0	0	10.1	s.	47	nw.	21	9	10	11	5.8	49
SOUTHERN SLOPE																																			
Abilene ²	1,755	4	59	951.6	1,011.2	0	96	71	83.4	+5.8	106	5	62	2	32	0	55	3.28	+6	1.01	7	8	0	0	15.3	s.	41	n.	10	17	6	7	4.3	77	
Amarillo ²	3,604	5	42	888.4	1,010.7	-8	89	61	75.0	+3.6	104	17	54	24	42	0	54	58	4.92	+2.1	3.46	9	11	0	0	13.6	s.	57	sw.	7	7	16	7	5.3	71
Del Rio ²	960	63	71	977.7	1,009.8	-7	96	74	85.3	+1.9	102	5	65	3	31	0	62	54	3.56	+1.0	2.23	5	7	0	0	10.2	se.	30	ne.	24	16	7	7	3.9	76
Roswell ²	3,614	6	29	889.9	1,009.5	-3	93	63	78.1	+1.8	105	17	54	29	41	0	50	45	1.57	-1.1	0.74	7	12	0	0	7.7	sw.	34	w.						

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS FOR JUNE 1948—Continued

District and station	Elevation of instruments			Pressure		Temperature of the air										Precipitation					Wind			Character of day (sunrise to sunset) number of days											
	Barometer above sea level ¹	Thermometer above ground	Anemometer above ground	Station	Sea level	Departure from normal	Averages				Extremes			Total heating degree days	Mean temperature of the dew point	Mean relative humidity	Total	Departure from normal	Greatest in 24 hours	Days with 0.01 inch or more	Days with thunderstorms	Total snowfall (unmelted)	Snow, sleet, and ice on ground at end of month	Average hourly speed	Prevailing direction	Maximum velocity			Clear	Partly cloudy	Cloudy	Average cloudiness, tenths (sunrise to sunset)	Possible sunshine		
							Mean maximum	Mean minimum	Mean	Departure from normal	Highest	Date	Lowest													Date	Greatest daily range	Miles per hour						Direction	Date
NORTH PACIFIC COAST																																			
North Head.....	211	5	55	1,010.5	1,018.0	0	61	54	57.4	+2.7	72	6	50	2	19	226	52.85	1.70	+1.5	.50	10	0	0	0	16.1	n.	35	n.	1	5	7	18	7.3	45	
Seattle.....	125	90	321	1,012.9	1,017.3	+4.4	72	55	63.8	+2.4	89	7	51	25	29	84	54.74	2.02	+1.7	.68	9	1	0	0	7.3	n.	22	s.	9	9	9	12	5.9	48	
Tacoma.....	194	172	201	1,010.2	1,016.9	+7.7	71	54	62.6	+3.9	82	9	49	23	26	104	1.61	+1.2	.72	7	0	0	0	7.5	n.	23	w.	10	8	10	12	5.6	50		
Tatoosh Island.....	86	5	61	1,015.2	1,018.3	+7.7	60	52	55.8	+2.8	75	7	48	9	22	274	52.89	1.11	+2.1	.36	10	0	0	0	9.4	s.	38	s.	9	6	8	16	6.7	49	
Burns.....	4,162	35	47	873.0	1,013.9	0	76	48	61.6	+3.1	90	29	41	22	39	139	44.58	2.55	+1.6	1.85	12	10	0	0	0	n.	0	0	11	6	13	5.5	50		
Eugene.....	433	4	35	1,001.4	1,017.3	+7.7	76	52	64.2	+2.2	93	29	44	22	38	78	54.72	1.10	+2.1	.57	7	2	0	0	0	n.	0	0	10	4	16	5.9	50		
Medford.....	1,329	29	58	968.2	1,015.2	+7.7	80	52	65.6	+2.2	101	28	43	22	44	64	52.67	2.90	+2.1	.62	11	10	0	0	0	nw.	0	0	11	11	8	8.0	50		
Portland, Oreg.....	154	68	106	1,011.5	1,017.3	+7.7	76	57	66.5	+4.1	93	7	52	23	31	49	58.66	1.42	+1.1	.84	6	1	0	0	6.0	nw.	16	nw.	5	7	5	18	6.8	64	
Roseburg.....	510	45	76	998.3	1,016.6	0	77	54	65.4	+2.9	95	8	47	22	36	55	53.70	1.79	+1.7	.55	8	2	0	0	5.2	n.	24	sw.	8	10	7	13	5.6	56	
MIDDLE PACIFIC COAST																																			
Eureka.....	60	72	88	1,015.6	1,018.0	0	60	52	56.0	+1.7	64	13	47	22	14	273	52.85	.51	+1.1	.21	8	3	0	0	7.5	nw.	24	n.	21	7	4	10	6.6	54	
Red Bluff.....	353	5	26	999.7	1,012.2	0	87	61	74.0	+7.8	102	27	52	5	36	14	51.50	1.26	+1.0	.91	4	6	0	0	7.6	nw.	26	nw.	21	16	10	4	3.9	77	
Sacramento.....	66	92	115	1,009.8	1,012.2	+7.7	83	56	69.7	+3.3	96	23	51	13	38	17	52.62	.01	+1.1	.01	1	0	0	0	8.1	s.	27	nw.	22	20	7	3	2.8	81	
San Francisco.....	155	112	132	1,009.1	1,014.9	+1.0	64	54	59.4	+9.9	80	22	51	1	22	175	52.78	.01	+2.2	.01	1	0	0	0	11.1	w.	29	w.	15	11	8	11	5.5	50	
SOUTH PACIFIC COAST																																			
Fresno.....	327	5	34	999.7	1,010.8	0	92	60	75.8	+1.1	108	30	54	3	39	0	51.47	.06	+0	.01	1	0	0	0	8.4	nw.	23	nw.	30	22	8	0	2.4	95	
Los Angeles.....	338	236	263	1,001.7	1,013.5	+6.6	76	58	67.0	+6.6	82	29	53	3	23	17	56.71	.16	+1.1	.16	2	2	0	0	6.0	w.	17	w.	10	16	9	5	4.2	69	
San Diego.....	87	20	55	1,010.8	1,013.9	+1.0	71	56	64.6	+4.4	74	11	52	6	17	26	55.74	.02	+0	.02	1	0	0	0	7.3	nw.	23	s.	21	6	16	8	5.8	54	
WEST INDIES																																			
San Juan, P. R.....	82	9	54	1,013.2	1,015.9	0	85	76	80.4	+7.7	91	11	71	17	14	0	75.82	6.77	+1.5	2.06	17	7	0	0	10.9	e.	29	e.	19	3	18	9	6.2	39	
PANAMA CANAL																																			
Balboa Heights.....	118	5	97	1,010.6	1,010.6	0	87	74	80.8	+6.6	92	24	71	12	17	0	75.87	6.32	+1.8	2.06	16	8	0	0	4.8	nw.	19	nw.	29	0	9	21	8.5	50	
Cristobal.....	23	37	92	1,010.6	1,010.6	0	84	76	80.4	+6.6	89	10	73	5	12	0	75.85	9.34	+4.2	2.06	22	3	0	0	6.4	nw.	20	nw.	23	0	7	23	8.1	50	
ALASKA																																			
Anchorage.....	132	6	44	1,012.5	1,017.6	0	64	44	53.9	+4.4	84	17	37	12	41	333	42.66	.42	+3.15	.15	6	0	0	0	6.5	s.	26	s.	19	2	9	19	7.9	50	
Annette Island.....	113	5	53	1,015.2	1,019.3	0	62	50	56.4	+1.4	86	10	44	30	30	269	48.78	5.10	+8.99	.12	2	0	0	0	0	se.	0	0	4	8	18	6.9	50		
Barrow.....	29	5	27	1,014.9	1,015.2	0	34	25	29.8	+4.5	40	27	15	11	15	1,054	28.96	.07	+2.07	.10	1	0	0	0	11.1	se.	30	se.	19	5	9	16	6.5	50	
Bethel.....	28	5	31	1,012.2	1,013.5	0	60	45	52.5	+4.4	76	17	39	6	26	377	45.78	1.67	+5.45	.19	0	0	0	0	8.0	e.	0	0	0	8	22	8.6	50		
Cordova.....	45	5	32	1,016.6	1,018.6	0	60	41	50.4	+1.1	71	16	33	8	32	443	46.86	5.59	+1.82	.19	15	0	0	0	0	e.	27	e.	18	5	4	21	7.1	50	
Fairbanks.....	455	5	63	996.6	1,013.5	0	69	48	56.8	+4.4	90	17	39	5	36	202	50.76	1.80	+4.43	.17	3	0	0	0	7.1	sw.	33	sw.	7	4	9	17	7.2	50	
Galena.....	139	4	66	1,006.8	1,011.5	0	67	52	59.2	+4.4	87	18	42	4	45	193	46.64	2.01	+1.21	.13	3	0	0	0	0	sw.	31	sw.	1	1	7	22	8.0	50	
Gambell.....	32	5	32	1,011.5	1,012.5	0	44	36	39.8	+1.6	56	22	29	3	18	756	36.91	1.22	+6.12	.12	0	0	0	0	13.0	n.	36	n.	6	0	9	21	8.0	50	
Juneau.....	80	6	30	1,018.0	1,018.6	0	66	44	55.4	+9.9	83	17	38	3	38	290	44.70	2.52	+1.26	.14	0	0	0	0	6.6	n.	27	se.	6	8	5	17	6.2	50	
Kotzebue.....	20	5	31	1,012.9	1,013.5	0	51	37	43.8	+1.1	81	18	20	4	32	634	38.95	.47	+0.14	.14	6	0	0	0	10.0	w.	26	w.	21	4	10	16	7.0	50	
McGrath.....	341	5	31	1,001.4	1,013.9	0	67	48	57.4	+7.7	84	17	40	2	30	236	44.64	1.01	+9.38	.10	2	0	0	0	0	s.	30	e.	18	0	3	27	8.4	50	
Nome.....	22	10	75	1,012.9	1,013.2	0	53	39	46.1	+7.5	80	18	28	1	52	569	40.86	1.24	+1.25	.12	1	9	0	0	8.5	sw.	34	e.	12	1	10	19	7.7	50	
Northway.....	1,718	5	32	982.6	1,015.2	0	70	45	57.4	+9.9	85	18	38	3	38	229	40.00	1.13	+9.35	.10	1	0	0	0	5.4	w.	26	w.	1	3	15	12	6.8	50	
HAWAII																																			
Honolulu.....	38	86	98	1,015.2	1,016.6	0	82	73	77.3	+7.7	84	2	70	9	12	0	66.68	.48	+4.17	.17	6	0	0	0	9.4	ne.	21	ne.	20	14	12	4	4.2	70	

SEVERE LOCAL STORMS FOR JUNE 1948

The table hereunder contains such data as have been received concerning severe local storms that occurred during the month. A revised list will appear in the United States Meteorological Yearbook.]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Torrance County, N. Mex.	June 1	2-3 p. m.			\$5,000	Hail	Storm northwest of McIntosh, with stones up to size of golf balls. Livestock injured and roofs damaged in addition to crop damage.
Moccasin, Mont., near	1	7-7:30 p. m.	120		15,000	do.	Path 30 miles long. Hail light in large area. Alfalfa and garden crops damaged; windows broken and shingles loosened.
Hot Springs, N. Mex.	2	3-4 p. m.			260,000	Hail, rain, and wind	Damage to buildings from hail, wind, and flooding; also hail damage to local fruit and gardens.
Lancaster, S. C.	2	Afternoon		1		Electrical	1 person killed by lightning.
Woodruff, S. C.	2	do.			6,000	do.	16 cattle killed by lightning.
Red Lodge, Mont., near	3	2 p. m.				Hail	Hail size of golf balls and about 12-inch depth of stones said to have fallen. Accompanying heavy rains caused overflowing of small creeks and loss of 8 head of hogs at Luther.
Southern Garden County, Nebr.	3	2:30 p. m.	12		50,000	do.	
Columbus, Mont., near	3	4-4:30 p. m.	880		5,000	do.	Path 20 miles long. Heavy hail damaged small grains and window-panes.
Irmo, S. C.	3	Afternoon		1		Electrical	1 person killed by lightning.
Merino, Colo.	4	p. m.		2		do.	2 boys killed by lightning beneath tree.
St. Louis City and St. Louis County, Mo.	5	6:40 p. m.				Wind	A few plate glass windows shattered; some trees and utility wires blown down. 3 slight injuries.
Lido Beach, Fla., near Sarasota.	5		35	0	150	Waterspout and tornado	Waterspout moved inland from Gulf of Mexico and broke some windows and trees. Path on land a few hundred yards long.
Florence County, S. C.	6	3 p. m.	134		25,000	Thunderstorm	Winds of near tornadic intensity and accompanying hail caused severe damage to crops and property in Vausentown Community.
Hampton, S. C.	6	4 p. m.			2,000	do.	High winds with hail caused damage, mostly to crops.
Glenwood, Pike County, Ark.	6	Afternoon			33,000	Electrical and hail	Hail up to ¾ inch diameter caused \$25,000 damage to crops in Glenwood area over several square miles. Lightning set fire to residence and store, resulting in \$8,000 loss.
El Dorado, Ark.	6	do.			10,000	Electrical	Lightning set fire to some storage facilities of oil refinery.
Sabine Parish, La.	6	6 p. m.			8,000	Wind	High wind in Zwolle and Dixie Communities unroofed baseball stadium, hurling pieces of lumber into chartered bus—injured 4 persons. Telephone and electric services disrupted in Dixie Community.
Dickinson County, Kans.	6	9:30 p. m.	13		125,000	Hail	In southern part of county, west of Herington. Growing crops in path almost totally destroyed.
Blenville Parish, La.	6					Wind and hail	Damage in Danville mostly to crops; as much as 10 to 25 percent of crops destroyed.
Butte, Mont.	6				10,000	Thunderstorm	Lightning struck Butte, Anaconda, and Pacific R. R. depot, which burned to ground.
Golden, Colo.	7	Midnight to 1 a. m.	850		162,000	Flood	A cloudburst in mountains northwest of Golden caused 25-foot wall of water to flood lower portion of Golden; bridges and highways washed out; homes and buildings flooded or demolished.
Southern Dodge, Washington and extreme northern Milwaukee Counties, Wis.	7	12 noon-4:30 p. m.	1-15		100,000	Thunderstorms and hail	Storm moved eastward in path 60 miles long. Damaged canning peas, tomatoes, other garden crops, and fruit on trees. Total loss of peas in some areas. Hailstones averaged ¼ inch in diameter, largest 1 inch or more.
Milwaukee, Wis.	7	12:22-12:27 p. m.			1,200	Wind	Utility lines downed in several places by falling trees; 4 plate glass windows broken; 3 persons injured.
Shiprock, N. Mex.	7	1-2 p. m.			2,500	Hail	Damage to fruit and truck gardens.
Kekomo and northwestern Howard County, Ind.	7	3 p. m.	1¼		75,000	Hail and wind	Hail up to 2 inches in diameter. ¾ of total damage was crop loss.
Middlesex County, Va.	7	3:30 p. m.	400	0	12,000	Tornadic wind	In Syringa area. Shed demolished; garage moved, twisted, and roof blown off; trees uprooted.
Clinton, Wis.	7	3:50 p. m.		1	500	Wind	Several trees blown down. Falling limb crushed truck cab, killing driver.
Anderson, Ind.	7	4:30 p. m.	15		100,000	Wind and hail	Hail up to 1¼ inches in diameter. One of worst storms on record.
Knox County, Ind.	7	5 p. m.	18		11,000	Hail and wind	1 injury.
Clark County, Ind.	7	6 p. m.	100	1	100,000	Tornado	Hail up to 1 inch in diameter. Damage includes \$1,000 loss to crops. Moved southeastward through Henryville. 20 injuries.
Hawley, Pa.	7				10,000	Electrical	Lightning destroyed a home and contents.
Baker County, Ore.	7-8	Afternoons and evenings.	Several			Thunderstorms, winds, cloudbursts, waterspouts, and hail.	Occurred over long stretch of Burnt River Valley and extended into part of Snake Valley. In Baker, trees blown over and limbs and other debris scattered over town; a large number of power interruptions occurred. At Hereford, ranch home set on fire by lightning burned to ground. At Mt. Carmel, large barn struck by lightning; burned, destroying 15 tons of baled hay and other items. Gardens riddled by hail. Swollen streams washed considerable land. At point in Snake Valley waterspouts dumped sufficient mud and other debris on highway to close it for several days; 2,500 yards of dirt moved before road was reopened.
Meade County, Kans.	8	12:30 p. m.	12			Wind and hail	In an east-west path in northern part of county. Some wheat damaged.
Copperhill, Tenn.	8	Early afternoon				Wind and rain	High winds damaged roofs, uprooted small trees, and caused minor damage to power and telephone lines.
Ellis, Harper, Woodward, and Dewey Counties, Okla.	8	2:30-4:30 p. m.	15		475,000	Hail and wind	Point between Fargo and Laverne to between Mutual and Selling, about 50-mile long path from northwest to southeast; 80 percent of damage by hail and 20 percent by wind. Crop damage \$360,000, included in total.
Bozeman, Mont., near	8	4-5 p. m.	880		20,000	Hail	Path about 4 miles long. Moderate hail caused considerable damage to spring wheat and peas.
Bridgeport, Wise County, Tex.	8	4:30 p. m.	12		3,000	Wind and hail	Hail damage to crops, \$1,000; wind damage to buildings, \$2,000.
Seigohachie, Conway County, Ark.	8	5:30 p. m.		1		Electrical	1 death by lightning.
Darlington, S. C., near	8	Late afternoon			10,000	Thunderstorm	High winds, with evidence of tornadic action, accompanied by hail, caused damage mostly to crops.
Caddo County, Okla.	8	6-6:45 p. m.	1-2		100,000	Hail and wind	From Eakly to southeast of Anadarko about 40 miles. 90 percent of damage by hail, 10 percent by wind. Principal damage to wheat nearly ready for harvest. Several buildings damaged by wind at Oney.
Felt, Cimarron County, Okla., near	8	P. m.	12		31,000	Hail	Damage mostly to growing wheat in area 40 sq. mi. \$1,000 damage to roofs and windows.
Kreybill, Colo.	8	P. m.	14½		110,000	do.	Hail caused heavy damage to wheat, hay, onions, and beets.
Tensas Parish, La.	9	12:50 p. m.			5,000	Wind and hail	One barn in St. Joseph destroyed, killing a mule. Early corn damaged by hail.
Cimarron County, Okla.	9	P. m.	12		20,000	Hail	Damage mostly to growing wheat in area about 20 sq. mi., near Wheelless.
Ness County, Kans.	9	6:30 p. m.	16		300,000	do.	Extended from Arnold to Ransom. Damage mostly to wheat.
Comanche County, Kans.	9	9:30 p. m.	12		20,000	do.	From Protection to Coldwater. Path mostly over pasture land. Some wheat damaged.
Butte, Mont.	9				12,150	Hail, wind, and rain	Local storm damaged gardens and flooded basements.
Wheeler and Gilliam Counties, Ore.	9-11	Late afternoons and evenings.	Several	2	500,000	Thunderstorms, rain, and hail.	Torrential rains and heavy hail. 20 bridges of Kinzua Railroad washed out. 2 persons killed when home washed away in flash flood. Roads destroyed at many points. Heavy rain and hail destroyed large acreage of wheat. Gardens and truck crops badly damaged.

See footnote at end of table.

SEVERE LOCAL STORMS FOR JUNE 1948—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Miles City, Mont., near Douglas County, Wash.	June 10	Early morning	12	1	\$2,000	Hail	Storm, light; length of path, about 15 miles.
	10	8 p. m.			2,000,000	Rain and hail	Torrential rains over much of county, with major destruction in south portion. Flood waters concentrated in Pine Canyon, where for 14 miles, highways and railroad beds were demolished. 22 highway and 27 railroad bridges washed out. Damage to railroads approximately one-half total; remainder of loss about equally divided between county roads and farm crops, mostly wheat. At Simms Corners, in center of storm, hail as large as walnuts did extensive damage to wheat in a belt 2 miles wide.
Ramsey, Mont.	11				20,500	Hail, wind, and rain	Most damage to roofs and windows from hail.
Madison and Delaware Counties, Ind.	12	2:30 p. m.			50,000	Wind	Much damage in Frankton.
Fort Wayne, Ind.	12	P. m.			10,000	Hail and wind	Severe wind gusts. Half of damage was crop loss.
Stark County, Ohio	12	4:30 p. m.		0		Tornado	Funnel-shaped cloud seen. Many trees uprooted; garage and barn demolished in Canton area.
Baltimore, Md.	12	4:31 p. m.		1		Thunderstorm and wind	Winds exceeding 60 m. p. h. uprooted trees, which in turn damaged buildings, automobiles, and telephone and electric wires. Building damaged considerably by lightning. High winds caused a light plane to crash; pilot killed. A Boeing C-14 flying boat, tied to a crane, carried several feet off ground to distance of about 40 feet, crashing and damaging considerably. 4 light planes at Baltimore Municipal Airport overturned and slightly damaged. A barn near Randalltown lifted off ground and collapsed.
Elko, Nev., vicinity of	12	5-5:30 p. m.	Several		15,000	Thunderstorm	A squall line of thunderstorms moved across northern Nevada with winds of hurricane force. Most activity along valley of Humboldt River. Intensity increased in Elko area due to funneling effect of ranges of mountains. At 5:02 p. m. absolute zero conditions existed at Elko: air filled with dust, dirt, and flying debris and wind 80 m. p. h. from southwest and strong gusts to 100 m. p. h. 1 house demolished, trees uprooted, and a number of roofs damaged.
Bicknell, Ind.	12	Evening			10,000	Wind and hail	Light hail.
Pueblo, Colo.	12	7:25-9:57 p. m.	15	3	210,000	Hail and flood	Hail 1 1/4 inches in diameter caused considerable crop loss. Flood loss principally in downtown Pueblo. 3 drowned in flash flood in Boggs Flat area west of Pueblo.
Blossville, Pa.	12					Hail	Hail, up to 2 inches in diameter, broke many windows and caused considerable crop damage.
Harrisburg, Pa., vicinity	12	7:30 p. m.			4,000	Thunderstorm	Many trees blown down; some sections without electricity. Roofs blown off and a few small buildings toppled. Lightning destroyed chicken house and chickens. Extensive damage to truck gardens by hail the size of hickory nuts and wind.
Box Butte County, Nebr.	13	3 p. m.	16-12	0	180,000	Hail, wind, and small tornado	Tobacco damaged.
Ringgold, Va.	13	Late afternoon			10,000	Hail	Path about 3 miles long. Severe damage to winter wheat.
Columbus, Mont., near	13	6-6:10 p. m.	880		10,000	do.	Hail damage to crops severe.
Belfry, Mont., near	13	6:30-7 p. m.	1 2/4			do.	This storm and one on 14th, and one on 15th and 16th covered most of Cheyenne County, northern Sherman County, and parts of Rawlins County. Hailstones up to size of billiard ball. Large areas of wheat totally destroyed and buildings damaged. Losses of the 3 storms, estimated by counties: Cheyenne, \$4,000,000; Sherman, \$230,000; Thomas, \$150,000; and Rawlins, \$50,000. Storm of 14th most extensive and severe of the three.
Cheyenne County, Kans.	13	9-10 p. m.			4,450,000 (for three storms)	Hail and wind	Considerable damage to beets, which are expected to recover.
Ballantine-Huntley area, Mont.	14	12:15 a. m.	12-2 1/4			Hail, wind, and rain	At Hannibal and vicinity many trees blown over, and fabric automobile tops and building roofs damaged. Gardens damaged by hail.
Marion County, Mo.	14	1 p. m.	12			Wind and hail	Crops almost completely destroyed over a 16-mile path from Meredosia to near Winchester by hailstones 1 inch and larger in diameter. Hail covered ground 4 inches deep on level after storm and in some places drifted by wind and rain into piles 3 to 4 feet high. 3 persons injured and a few hundred chickens and several pigs killed by hail. A large number of windows broken; several cars damaged; much other minor property damage.
Morgan and Scott Counties, Ill.	14	2 p. m.	1 1/4		1,076,500	Hail	From Bogard through Standish to east of Wakenda. Hay barn destroyed when struck by lightning. Some poultry killed by hail. Many windowpanes broken and some roofs damaged by hail. 1 person injured when struck by large hail up to the size of hen's egg. Much damage to standing crops.
Carroll County, Mo.	14	3-5 p. m.	11		30,000	Hail and electrical	In vicinity of Elsberry, roofs damaged, many windows broken, and some greenhouse sashes destroyed; gardens damaged.
Lincoln County, Mo.	14	4 p. m.	11			Hail	Considerable damage to small grains.
Denton, Mont., near	14	4-4:15 p. m.	440		1,500	do.	Considerable damage to wheat in area 1 mile square.
Box Elder, Mont.	14	4-4:05 p. m.	11		2,000	do.	Heavy hail caused considerable damage to wheat and barley. Path about 2 1/4 miles long.
Coffee Creek, Mont.	14	4-4:15 p. m.	440		8,000	do.	In scattered parts of county, roofs damaged, many windowpanes destroyed, and standing crops, including gardens, damaged. Damage to crops estimated at about \$300,000; to livestock and poultry, \$1,000; and to buildings, automobiles, and other property, about \$30,000.
Saline County, Mo.	14	4:45 p. m.	1 1/2-2		321,000	Wind and hail	Most damage in rural areas.
Le Roy, Colo.	14	5-6 p. m.	1 1/4		20,000	Hail	Hail from 1/4 to 2 inches in diameter caused about 50 percent crop loss in some areas near Le Roy.
Wray, Colo.	14	P. m.			5,000	do.	2-inch hailstones caused damage to automobiles and buildings.
Cooper County, Mo.	14	5:45 p. m.	13		100,000	Wind and hail	At Pilot Grove and vicinity. Hardly a home escaped damage, especially roofs. 1 person slightly injured by hail. Some poultry killed and some crop damage. Damage mostly from hail.
Cooper County, Mo.	14	5:50 p. m.	110		11,000	Hail	At Blackwater and vicinity. Wheat and oats flattened; corn stripped; some roofs damaged; many windows broken.
Volborg, Mont.	14	6-6:30 p. m.	12		20,000	do.	Heavy hail damaged winter wheat considerably.
Ballantine-Huntley area, Mont.	14	6:30 p. m.	12-2 1/4			do.	Moderate damage to beets and small grains.
Stanford, Mont., near	14				880	do.	Moderate hail caused considerable damage in small area to wheat.
Cooper County, Mo.	14	6:30 p. m.	18		10,000	Wind and hail	At Bunceton and vicinity. Wheat and oats flattened; some corn damaged. Many roofs damaged by hail. Many birds and some chickens killed. 1 barn blown down.
Athens, Ga.	14	8:20 p. m.			650	do.	Hail up to 1/4-inch in diameter, but little damage. High winds at airport 2 miles east of Athens upturned aircraft, causing damages of about \$650.
Cheyenne, Rawlins, Sherman, and Thomas Counties, Kans.	14	8:30-9 p. m.				do.	See remarks on storm of 13th in Kansas.
Haigler, Nebr., near	14	10 p. m.	112		1,800,000	Hail, rain, and wind	Some hailstones 4 inches in diameter. Rain excessive. High wind.
Ness County, Kans.	14	11 p. m.	16		75,000	Hail	Over practically same path as storm of 9th. Much wheat a total loss.

See footnote at end of table.

SEVERE LOCAL STORMS FOR JUNE 1948—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Russell County, Kans.	June 15	12:15-4 a. m.		0	\$75,000	Wind, tornado, and hail.	Windstorm covered greater part of county. Hail in strip 3 miles wide and 10 miles long from Dorrance to beyond Wilson; damaged wheat 25 to 50 percent. Evidence that tornado passed over Russell south-eastward, ending near Bunker Hill. Most of wind damage in Russell. From near Beeler to south of Alexander. Chief damage by hail to wheat.
Nees and Rush Counties, Kans.	15	1-3 a. m.	1		625,000	Hail and wind.	Covered most of McPherson and Harvey Counties and extended into Marion County. Chief damage from wind blowing wheat down just before harvest. Many power and telephone lines down. Several large barns burned by lightning. Several barns and roofs damaged by wind. Hail damage estimated at \$25,000.
McPherson, Harvey, and Marion Counties, Kans.	15	1:30-3 a. m.			2,175,000	Electrical, wind, and hail.	Small buildings and trees damaged in Hutchinson and Nickerson.
Reno County, Kans.	15	Early morning.				Wind.	Hail considerably damaged crops in Coosa Community.
Rome, Ga., west of	15	Early a. m.				Hail.	In Middle River area. Barley, wheat, corn, and fruit damaged; trees defoliated.
Augusta County, Va.	15	3:30-5 p. m.	1,300		25,000	Hail and wind.	Trees uprooted; crops, mainly wheat, damaged; some damage to barn.
Fork Union, Va.	15	4-5:30 p. m.			7,600	do.	Moderate hail damaged range grasslands in path about 18 miles long.
Miles City, Mont., near	15	4-4:15 p. m.	14		1,000	Hail.	Moderate hail considerably damaged small grains. Storm southwest to northeast; then reversed its direction over 2-mile path.
Bozeman, Mont., near	15	5-5:10 p. m.	880		10,000	Hail.	Estimated \$50,000 loss to wheat and \$25,000 damage to buildings.
Holyoke, Colo.	15	P. m.			75,000	do.	A 40 percent loss to wheat crop in path.
Wray, Colo.	15	P. m.			10,000	do.	Hail from 3/4 to 1 inch in diameter caused severe loss to crops in path 15 miles long; some damage to buildings.
Peeble, Colo.	15	5:50-6:30 p. m.	14 1/2		75,000	do.	Hail as large as 1 1/4 inches in diameter caused severe damage to buildings and crops in an area approximately 25 miles long. Damage includes \$1,000,000 crop loss.
Crook, Iliff, Proctor, and Sterling, Colo.	15	6-9 p. m.	110		1,100,000	do.	
Eastern Valley County, Nebr.	15	6:30 p. m.	11-2		120,000	Hail and wind.	
Garvin County, Okla.	15			1		Electrical.	Man killed by lightning at Lindsay.
Denton, Mont.	15	8 p. m.	11-1 1/2		1,500	Hail.	
Cheyenne County, Kans.	15-16	11 p. m. until past midnight.				Hail and wind.	See remarks on storm of 13th in Kansas.
Pendleton, Ore., vicinity	15	Near midnight.	Sever-		20,200	Electrical and cloud-bursts.	Torrential rains eroded considerable soil on farm land surrounding Pendleton. Number of basements in city flooded. 1 home struck by lightning, completely destroyed.
Logan and Scott Counties, Kans.	16	2:15 a. m.	110		1,000,000	Hail.	Path from near Page City to Scott City, where hailstones still on ground at daybreak. Losses to crops, mostly wheat, ranged from 50 to 100 percent.
Reno County, Kans.	16	3:41-8:28 a. m.	110		90,000	Wind.	Path extended through Hutchinson. \$40,000 damage to crops, principally wheat.
Harvey County, Kans.	16	5 a. m.				Wind and hail.	Damage comparatively light. Some small buildings blown down.
Millsboro, Del.	16	9-10 a. m.			10,000	Wind.	Strong winds blew in windowpanes, uprooted trees, and tore porches loose. Large plate glass windows of furniture company blown in and display of furniture and television sets ruined. Telephone and electric wires disrupted for several hours.
Ennis, Mont., near	16	1 p. m.	18			Hail.	Heavy hail considerably damaged gardens and small grains.
Little Rock, Ark.	16	1:30 p. m.			20,000	Thunderstorm.	Gusty winds to 70 m. p. h. Damage widespread. Windows, signs, and small buildings damaged \$3,000; 10 planes stored at airport damaged, \$12,000. Numerous trees blown down and communications and power disrupted.
Mesa, Idaho.	16	4 p. m.	440			Hail.	Hailstones 1/4 to 1/2 inch in diameter caused considerable damage to apples over area 1 1/2 miles long.
Joliet, Mont., near	16	Afternoon.	11			do.	50 percent damage to crops over path 3 to 5 miles long.
Hardin, Mont., near	16	5 p. m.	13-4		100,000	do.	Heavy hail, over 1 inch in diameter, caused severe damage to small grains, hay, and sugarbeets; also broke some windowpanes.
Arkansas, entire State.	16	Afternoon to early evening.			25,000	Thunderstorm.	A line of thunderstorms crossed State. Damage mostly to small out-buildings, trees, and power lines. 1 house set afire by lightning near Morrilton.
Western Cuming County, Nebr.	16	5:45 p. m.	13-5		1,300,000	Hail, rain, and wind.	Rain excessive.
Billings, Mont., near	16	6-8 p. m.	11			Hail.	Path over 30 miles long. Moderate to heavy hail caused heavy damage to beans and wheat.
Ryegate, Mont., near	16	8-10 p. m.	125		13,000	Hail and rain.	3 inches of rain caused local flash flood. Considerable damage to roads and bridges and some damage to grain fields by flooding. Damage includes \$10,000 loss of crops.
Elba, Nebr., and vicinity	16	8:30 p. m.	13-6		400,000	Hail.	
Melville, Mont., near	16	8:35 p. m.	13		3,000	Hail and rain.	Heavy hail and rain damaged grain crops considerably; \$200 loss to property.
Morrill County, Nebr., central portion.	16	10 p. m.	13		300,000	Hail.	
Lyman to Gering, Nebr.	16	10 p. m.	11-8		390,000	Hail and rain.	Some hailstones as large as baseballs. Some land badly washed.
Sheridan County, Nebr., central portion.	16	11 p. m.	11-3		72,000	Hail.	
Red Bird, Wyo.	16	11:30-11:50 p. m.	14		1,600	do.	\$1,200 of the damage to crops.
Sheridan, Johnson, and Campbell Counties, Wyo.	16	Near midnight.				do.	Serious damage to crops; property damage in city of Sheridan.
Pettis County, Mo.	17	10:30 a. m.			4,000	do.	In scattered areas. Some glass in greenhouses broken. Crop damage slight.
Converse and Niobrara Counties, Wyo.	17	2-3 p. m.	14	0	100,000	Tornado and hail.	Serious damage to crops. Many farm and ranch buildings damaged or destroyed.
Reno County, Kans.	17	4 p. m.	110	1	100,000	Wind.	Path extended through Hutchinson, where chief damage occurred. 4 persons injured. About half of damage to crops.
Pemiscot County, Mo.	17	5-7 p. m.	14-2			do.	Many poles and utility wires down.
Bourbon and Crawford Counties, Kans.	17	5:30-7 p. m.			40,000	do.	Occurred over much of southern Bourbon and most of Crawford County. Jayhawk Plant near Pittsburg damaged to extent of \$30,000. Many small buildings wrecked. Power and telephone lines down. 1 injury.
Meade County, Kans.	18	Noon.	118	0	40,000	Wind, tornado, and hail.	Path extended from 8 miles northwest of Meade through that city. Tornado seen high in air but did not reach ground. Hail damage \$20,000.
Strasburg, Colo.	18	P. m.	11 1/4		100,000	Hail.	Between Bennett and Strasburg. Damage includes \$95,000 crop loss.
Sedan, N. Mex.	18	5-6 p. m.			12,000	do.	Damage to crops and buildings.
Tucumcari, N. Mex.	18	7:15-7:35 p. m.			250,000	Hail and rain.	Most severe local hailstorm in years. Heavy crop damage and extensive damage to roofs and windows.
Endee, N. Mex.	18	8-8:30 p. m.			7,200	Hail.	Wheat total loss. 2 calves killed.
Nara Visa, N. Mex.	18-19	Midnight 18th; 3-5 p. m. 19th.			4,000	Rain and hail.	Rainfall total 5.09 inches for 24 hours. Crops washed out. Some hail damage to buildings.
Crawford County, Ohio.	19	Noon.			75,000	Electrical.	Amusement park near Bucyrus burned when struck by lightning.
Carroll County, Ohio.	19	1:30 p. m.				Hail.	Many windows broken; automobiles and roofs damaged.
Jefferson County, Ohio.	19	2:30 p. m.				Wind.	2 persons injured; trees and power lines blown down, roofs damaged, and windows broken.

See footnote at end of table.

SEVERE LOCAL STORMS FOR JUNE 1948—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Summit County, Ohio	June 19					Hail	Heavy damage to crops and gardens.
Central Counties, Ohio	19	Afternoon				Wind and hail	Trees and utility poles and lines blown down. Hail damaged crops. Several roofs blown off and windows broken.
Baltimore, Md.	19	3 p. m.				Thunderstorm, wind, and hail.	Damage caused chiefly by hail. School reported damage of broken windows and ripped awnings. 1 home and a warehouse struck by lightning and damaged. Hailstones measured 10 1/4 inches in circumference.
Kent County, Md.	19	3 p. m.	12-3		\$100,000	do.	Hail beat down crops of grain and tomatoes, causing complete loss in most places. Many windowpanes broken: 1 farm reported approximately 100 panes broken in house and outbuildings, with loss totaling \$5,000, including damaged roofs. 1 cow drowned and 2 killed by lightning. Hailstones so numerous that 19 hours later they could be shoveled out of gutters and ditches.
Montgomery, Ala.	19	3:46 p. m.			5,000	Thundersquall	Tree blown across automobile, wrecking it. Several plate glass windows broken, and expensive signs damaged. Man injured by "live" wire.
Montgomery County, Md.	19	P. m.			20,000	Wind and rain	Strong winds blew over trees, tore off roof of 1 building completely, and damaged at least 3 others. Electric and telephone lines down for several hours. Most of damage near Darnestown and Rockville.
Queen Annes County, Md.	19	P. m.			500,000	Thunderstorm, hail, and wind.	Hail up to size of goose eggs caused loss to grain and hay, leaving it as if mashed by giant steam roller. Hundreds of windowpanes broken in homes and other buildings. Car tops dented badly and slate and asbestos roofs torn by large pellets. Some livestock and poultry killed.
Frederick County, Md.	19	P. m.		1		Thunderstorm	Boy struck and killed by lightning near his home in Union Mills.
Anne Arundel County, Md.	19	6 p. m.	12		50,000	Hail and wind	At least 6 barns blown down. Corn crop ruined and tobacco severely damaged.
Talbot County, Md.	19	6:30 p. m.			60,000	Thunderstorm and hail.	Tilghman struck hardest, with broken windowpanes and damaged roofs. Wheat destroyed more than other crops; much straw cut off about 8 inches from ground.
Dorchester County, Md.	19	6:45 p. m.	18			do.	Most of damage occurred in and around Cambridge, Castle Haven, Salem, and Maple Dam. Hail damaged crops, roofs, and window glass. About 2,000 windowpanes broken in Cambridge and Salem alone.
Penn Line, Pa., 25 miles northeast.	19	8 p. m.				Wind	Strong winds uprooted trees and blew silos over and roofs off. 1 injury.
Grant County, W. Va.	19	10 p. m.		0		Tornado or strong wind.	Path of damage from between Bayard and Thomas eastward through Stony River region to Bismarck Community. Considerable damage to farm buildings; some livestock killed. Much timber blown down, obstructing highways. Storm dipped down mountainside and damaged buildings at Geiser place.
Washington County, Okla.	20	3:45 p. m.	50	0	5,500	Tornado	Path 1,000 ft. long. Damage to buildings at Hulah Dam.
Montgomery County, Kans.	20	4:10 p. m.	11		5,000	Hail	At Independence and many other parts of county. Automobiles, roofs, and truck damaged.
Ryegate, Mont, near	20	4:30 p. m.	13		1,000	do.	Light hail damaged wheat.
Ness County, Kans.	20	5 p. m.				do.	2 hailstorms occurred at about same time, one 10 miles south of Ness City, the other near Brownell. Much damage to wheat.
Tillman and Comanche Counties, Okla.	20	5:30-6 p. m.	13	0	22,000	Tornado	Path in northeasterly direction from 8 miles southwest of Chattanooga to near Lawton, about 20 miles. Some damage to aircraft at Fort Sill.
Cherokee, Crawford, and Bourbon Counties, Kans.	20	6:05 p. m.	440	0	191,000	Tornado and wind	Tornado originated about 2 miles southwest of Jayhawk Works of Spencer Chemical Company, about 8 miles east and 4 miles south of Columbus, and ended near Carl Junction, Mo. Damage at chemical plant totaled \$50,000. High winds caused damage over much of Cherokee, Crawford, and southern Bourbon Counties.
Jasper County, Mo.	20	6:25 p. m.	11		75,000	Wind	Several roofs blown off in Carl Junction and vicinity. Damage includes about \$5,000 crop loss.
Boone County, Mo.	20	8 p. m.	130	0	5,000	Small tornado	3 homes damaged in Ashland; 1 man slightly injured. Crop damage slight.
Oklahoma County, Okla.	20	8 p. m.			2,000	Wind	Damage to aircraft and hangars at Will Rogers Field.
Thomas County, Kans.	20	Night	16		17,500	Hail	South of Colby. Damage to wheat.
Noble County, Okla.	21	Midnight-1 a. m.		0	10,000	Tornado	Damage to a large barn, and to ripened, uncut grain near Perry.
Red Willow County, Nebr.	21	11 a. m.-10 p. m.			2,400,000	Hail and rain	Numerous rather small storms; excessive rain.
Washita County, Okla.	21	12 noon-1:30 p. m.	11		12,500	Wind and hail	Path 5 miles long northwest and north of Cordell. \$2,500 damage to unharvested wheat.
Dearborn and Ripley Counties, Ind.	21	2 p. m.	13		50,000	do.	Hail up to 1 1/4 inches in diameter. Half of damage was crop loss.
Old Hickory, Tenn., near Nashville.	21	2 p. m.		1		Electrical	1 man killed by lightning, 2 others injured.
Newberry County, S. C.	21	Afternoon			500	do.	Smoke house destroyed by fire from lightning in Harmon Quarters Section.
Cozad, Nebr., near	21	3 p. m.	10-12	0	960,000	Rain, hail, and tornado.	Rain excessive.
Klows and Washita Counties, Okla.	21	3-4 p. m.	12 1/2		51,000	Wind, hail, and rain.	Path about 50 miles long from Roosevelt to Hydro, in a northeasterly direction. \$36,000 damage to crops: damage by high wind 40 percent; hail, 50 percent; and heavy rain, 10 percent.
Tulsa County, Okla.	21	3:45 p. m.	220	0	13,000	Tornado and hail	Most of damage to aircraft and hangars. Storm moved northeastward over path about 10 miles long. Funnel cloud observed by many.
Barber and Harper Counties, Kans.	21	4:03-4:51 p. m.	650	0	50,000	Tornado	Originated 16 miles southwest of Medicine Lodge. Passed just south of Sharon and ended near Duquoin. Chief damage near Sharon. 1 person injured. Path not continuous.
Indianapolis, Ind.	21	6 p. m.			10,000	Wind	Airplane wrecked. Some trees and wires down.
Darke County, Ohio	21		440		20,000	do.	Path of destruction about 1 mile long.
Sedgwick County, Kans.	21	7:15-7:30 p. m.	880	0	1,000,000	Tornado	Originated 4 miles southwest of downtown Wichita; ended about 4 miles northeast of city. Apparently 2 distinct paths passed through Wichita. Chief damage in southwest part of city at Westport Field, where Aero Parts Plant was badly damaged and planes were wrecked. 12 persons injured.
Lawrence County, Mo.	21	8:30 p. m.	880		10,000	Wind and hail	Mostly in Pierce City and vicinity. Many large shade trees destroyed; some homes damaged, several by falling trees; many utility wires down. Crop damage slight.
Harmon County, Okla.	21	11:30 p. m.	110		10,000	Wind, rain, and electrical.	Path 15 miles long. 1 house burned after being struck by lightning near Vinson. Cotton and feed crops damaged.
Creek to Osage Counties, Okla.	22	3-7 a. m.	15		2,000	Wind, hail, and rain.	Damage to farm property southwest of Mannford. Damage includes \$1,000 loss to crops; 50 percent of damage due to high wind, 25 percent to hail.
Johnson and Otoe Counties, Nebr.	22	3-4 p. m.	440	1	306,000	Tornado	Nearly all damage to buildings. Storm passed near Cook and Talmage and continued into Iowa.
Pierce County, Nebr.	22	4 p. m.	50	0	65,000	do.	Path 13 miles long. Storm traveled northeastward.

See footnote at end of table.

SEVERE LOCAL STORMS FOR JUNE 1948—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Fremont and Mills Counties, Iowa.	June 22	4-5 p. m.	100-200	0	\$450,000	Tornado	Started near Talmage, Nebr., crossed Missouri River to south of Nebraska City into Iowa; traveled northeastward, passed north of Sidney and east of Randolph in Fremont County; continued into Mills County to near Emerson. Total length of storm path, about 30 to 35 miles in Iowa. Storm traveled slowly through river bottom lands in Fremont County, with considerable damage first 3 miles; then hopped over bottomlands very slowly until it struck higher hills country where it moved more rapidly, with destruction generally more complete. Damage includes \$200,000 loss to crops. Damage mainly to farm homes and buildings. 1 person injured at Emerson. Path extended from southwest of Horton to near Leona. Chief damage to buildings and wire services in Horton. Many characteristics of a tornado, but no vortex cloud seen. 3 persons injured.
Brown County, Kans.	22	4:45-5 p. m.	440		250,000	Wind	Damage to hangars and other buildings and aircraft near Weatherford. Destruction in warehouse caused by fire from lightning.
Custer County, Okla.	22	5:30 p. m.			20,000	do.	Wind tore down trees; power and telephone lines out of commission.
Winnesho, S. O.	22	Afternoon			20,000	Electrical	Roof torn off house and carried 100 ft. Man killed by lightning.
Ingham and Eaton Counties, Mich.	22	7 p. m.		1	30,000	Thunderstorm	Occurred a few miles west of Hillsdale. Damage to rural property.
Miami County, Kans.	22	7:30 p. m.	75	0	10,000	Tornado	Storm in and near Purdin. About 50 trees uprooted; several porches torn off; few buildings moved on foundations.
Linn County, Mo.	22	8 p. m.	880		6,950	Wind	Telephone and power lines blown down; trees damaged; stock in store basements damaged by water. Storm damage width, about 14 mile near Ithaca.
Isabella and Gratiot Counties, Mich.	22	4-8:30 p. m.			10,000	Thunderstorm	Storm at Chillicothe Municipal Airport, 3 miles east of Chillicothe. Hangar and several planes damaged; number of trees uprooted.
Livingston County, Mo.	22	9:30 p. m.	70		14,000	Wind	Lake freighter, J. P. Morgan, Jr., rammed by freighter Crete in collision, causing gaping hole in side; 2 crew members killed and 3 injured. Crete not so seriously damaged. 2 other steamships collided. Damage to 4 ships estimated at \$500,000.
North of Apostle Islands, Lake Superior, Wis.	23	A. m.		2	500,000	Fog	1 person killed by lightning in each community; 2 mules destroyed by lightning at Kingstree.
Charleston and Kingstree, S. C.	23	Afternoon		2	250	Electrical	Minor damage, mostly to trees.
Lawrence County, Ohio	24	11:15 a. m.				Wind	"Live" wire fell on truck, and man killed as he touched door handle.
Parkersburg, W. Va.	24	12:14 p. m.		1		Thunderstorm and wind	Property damage slight.
Fort Benton, Mont. near	24	2-3 p. m.	13		200,000	Hail	Moderate hail caused considerable to severe damage to wheat and barley over 10-mile path.
St. Johnsbury, Vt.	24	2:30-5:00 p. m.			8,000	Thunderstorm, wind, rain, and hail	Worst storm since 1938 hurricane in St. Johnsbury vicinity. Trees felled and uprooted, damaging parked cars and residences; a portion of roof of Canadian Pacific roundhouse torn off and section of wall collapsed. Power and telephone cables torn down, crippling electric power and communication facilities. 2 1/2 inches of rain caused wash-outs on secondary roads, driveways, and lawns. Windows broken in industrial plants, and other minor damage caused by hail. A few stones, irregularly-shaped and nearly an inch in length.
Baltimore, Md.	24	5 p. m.				Thunderstorm and wind	Gale winds toppled trees, blew down power lines and chimneys, and tore off shutters, shingles, and parts of roofs. Marquee of motion picture theater blown off, damaging parked car. At least 6 other parked automobiles damaged when trees or other debris were blown on them. In northern section of city alone, more than 100 trees cleared from roads and streets. Lightning struck and disabled 2 streetcars and struck a home. Gas and Electric Company reported more damage than in 6 years.
Carroll and Howard County, Md.	24	P. m.			15,000	Thunderstorm and hail	Damage in vicinities of Sykesville, Fulton, Clarksville, and Ellicott City. Greatest loss to wheat and barley.
Montgomery County, Md.	24	P. m.			2,000	do.	Grain hurt most. Hail stripped trees and grains.
Sandcoulee, Mont.	24	7 p. m.				Hail	Heavy hail caused little damage to roofs. Hail, size of pigeon eggs.
Bellwood to Rogers, Nebr.	24	7 p. m.			56,000	do.	
Marcus Hook, Pa.	24	7:45 p. m.	13			Thunderstorm	Considerable damage to property, trees, and electric service.
Hawley, Pa., 10 miles north.	24					do.	6 cows and 1 horse killed by lightning. Much property damage by wind; utilities disrupted.
Gettysburg, Pa.	24					do.	Strong winds damaged trees and utility lines and unroofed a few buildings.
Juniata, Pa.	24					do.	Trees and utility lines damaged.
McConnellstown, Pa.	24					do.	Winds destroyed trees and damaged utility line poles.
Port Allegheny, Pa., vicinity of	24			1		Electrical	Man killed by lightning.
Franconia Notch, N. H.	24					Thunderstorm and rain	Heavy rain caused several landslides, burying Franconia Notch highway under 20 feet of earth and rocks; largest slide covered 350 feet of highway. Traffic discontinued for several days.
Riverton, Wyo.	24				54,000	Hail	Damage to crops, \$50,000; to 5 airplanes at Riverton airport, \$4,000.
Oakdale, Nebr., near	24	Ended 11 p. m.	14		24,000	do.	
Ellis County, Okla., northern part.	25	8:30 a. m.		1		Electrical	Farmer killed by lightning, west of Fort Supply.
Hot Springs, Va.	25	3:15 p. m.		1		Lightning	1 person killed on golf course; 3 others stunned.
Holyoke, Colo.	25	P. m.			100,000	Hail	Buildings damaged, \$15,000; crop loss, 60 to 90 percent in storm path.
Minnesota, extreme southern counties.	25	P. m.	13		800,000	do.	Heavy hail, accompanying severe thunderstorms, caused much damage to growing crops and considerable damage to property and automobiles. Some fields of corn, beans, peas, and small grains a total loss. Trees stripped of leaves. Much poultry and game birds perished and livestock were injured.
Dodge, Olmsted, Fillmore, Winona, and Houston Counties, Minn.	25	4:30 p. m.	15		75,000	Thundersquall	Barns, outbuildings, silos, and windmills demolished or damaged; buildings and houses unroofed or otherwise damaged; many trees uprooted; power and communication lines disrupted. 2 auto trucks blown off road. Growing crops lodged.
Tyro Township, Yellow Medicine County, Minn.	25	5:00 p. m.		0	1,000	Thundersquall (possibly small tornado).	Large feeding shed, pumphouse, and small outbuilding carried some distance.
Gays Mills, Wis., 5 mi. northwest.	25	6-6:40 p. m.	13		60,000	Hail	Storm moved eastward in path 5 miles long. Tobacco damaged up to 100 percent; considerable damage to corn, grain, and gardens. Damage includes \$50,000 crop loss. Windows broken and roofs and car tops damaged. Hailstones averaged 1 inch; largest were 2 inches in diameter.
Thomas County, Kans.	25-26	Night	12		50,000	do.	Southern part of county. Damage to wheat.
Arrow Creek and Coffee Creek areas, Mont.	26	12-12:30 p. m.	12 1/2			do.	Light to heavy hail considerably damaged wheat over 8-mile path.
Southern Outagamie and northeastern Winnebago Counties, Wis.	26	1:10-2:30 p. m.			20,000	Electrical, wind, and rain.	Wind wrecked barn and downed trees, branches, utility poles, and wires. Lightning damaged power lines and 2 buildings. Water flooded streets and basements in Appleton.
Salem, Benjamin, and LeLand, Utah.	26	3-4 p. m.	13-5		250,000	Hail	Damage mostly to crops. Hailstones up to 1 inch in diameter.
Nashville, Tenn.	26	3:30 p. m.	100	0		Tornadic winds	Wind of tornadic character or "Baby Twister" occurred in west Nashville; damaged 2 homes and power and telephone lines.
Miami, Fla.	26	3:30-3:39 p. m.		0		Waterspout	

See footnote at end of table.

SEVERE LOCAL STORMS FOR JUNE 1948—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Columbus, Mont., near	June 26	5:30-5:45 p. m.	880		\$1,000	Hail	Moderate hail considerably damaged winter wheat locally.
Fort Benton, Mont., near	26		1 1/2-1			do.	Moderate to severe damage to wheat and barley in 20-mile path.
Genoa, Nebr., near	26				5,500	Electrical	2 barns and contents destroyed by resultant fires.
Letter Kenny, Pa.	26					Thunderstorm	Wind and hail caused damage to crops.
Little Dolores, Colo.	27	11:25 a. m.-Noon	1 3/4		1,000	Hail and rain	Hail damaged gardens and orchards, and heavy rain washed out roads in several places.
Putnam County, Mo.	27	12 noon	100		2,000	Wind	Storm at Hartford where 1 large barn was destroyed.
Red Bolling Springs, Tenn.	27	2 p. m.				Thunderstorm	1 home damaged by lightning; high winds uprooted some trees.
Greenville, S. C., near	27	Afternoon			3,000	do.	High winds damaged property and crops in Berea Community.
Hazleton, Pa., vicinity	27	Afternoon		0	100,000	Tornado	Wind destroyed many roofs, billboards, tree limbs, and buildings.
Mahanoy City, Pa.	27	Afternoon				Electrical	Lightning struck and destroyed dress factory.
Philadelphia, Pa.	27	Afternoon				Electrical and wind	Lightning seriously injured workman; also struck sub-station of Philadelphia Electric Co., disrupting service. Winds damaged trees and billboards.
Pine Grove, Pa.	27	Afternoon				Thunderstorm	Crops and trees damaged.
Anne Arundel County, Md.	27					Thunderstorm and wind	Trees uprooted; electric and telephone services disrupted; farm buildings razed; and 2 roofs lifted from tobacco barns.
Tillman County, Okla.	27	7:15 p. m.			2,500	Wind	Several buildings unroofed and windows broken near Frederick.
Richmond, Va.	27	7:30-8:15 p. m.				Electrical	Considerable minor damage to power lines in west end; local flooding in streets.
Woods and Alfalfa Counties, Okla.	27	9:30 p. m.			20,000	Wind, rain, and electrical	Storm covered most of Woods County and parts of Alfalfa County. \$10,000 damage to uncut wheat.
Montgomery and Wilson Counties, Kans.	27	11:25 p. m.	880	0	11,000	Wind and tornado	Tornado path began 1/2 mile southwest of Elk City and damaged property across western and northern parts of town, with path 1 1/2 miles long. High winds covered much of southern Wilson and northern Montgomery Counties.
Phelps County, Mo.	27-28	Night			25,000	Electrical	U. S. Bureau of Mines Building at Rolla struck by lightning. Top floors gutted by fire.
Choctaw County, Okla.	28	10 a. m.	880		3,500	Wind and hail	95 percent of damage by high winds, 5 percent by hail. \$1,000 damage to corn crop. Storm from Golden Bluff on Red River to about 7 miles south of Fort Towson.
North Syracuse, N. Y.	28	1 p. m.				do.	High wind felled trees and broke power lines and tree branches. Hail broke many windows.
Champaign-Vermilion Counties, Ill.	28	2:20 p. m.	100	0	10,000	Tornado	Path about 7 miles long, from Ogden to Fithian. 6 farms suffered property damage; little crop loss.
Putnam County, Ohio	28	6 p. m.				Wind and electrical	1 man injured by lightning. 1 barn unroofed; minor damage to other farm property.
Allen County, Ohio	28	6:30 p. m.	880			Wind	Wheat and oats flattened, buildings unroofed, and trees uprooted.
Ingham and Shiawassee Counties, Mich.	28	7-8 p. m.			40,000	Thunderstorm	Trees uprooted; some telephone cable snapped; a number of billboards blown down; some truck gardens damaged by hail. Several hogs killed when barn was blown down.
Kalamazoo and Calhoun Counties, Mich.	28	Early evening			100,000	do.	Houses damaged; numerous barns leveled; telephone and power poles felled; trees blown down.
Jackson and Pike Counties, Ohio	29	Noon	13		18,000	Wind	Hundreds of trees uprooted; barns and other buildings damaged. Damage includes \$12,000 loss to crops.
Clinton County, Ohio	29	Noon	18			do.	Damage mostly to telephone and power lines.
Pierce County, Wis., southern portion	29	2:15-2:45 p. m.	1,320		10,000	Hail	Storm moved eastward. Hailstones 1/2 to 1 inch in diameter. Grain damaged.
Iowa, scattered sections	29	4-5:30 p. m.				do.	Extensive damage at a few points. In Worth County, near Jolice, crops on 15 or more farms badly damaged. Hail and wind caused up to \$125,000 damage in 3 X 18 mile area southwest of Ogden in Boone County.
Hagerstown, Md.	29	P. m.				Thunderstorm	Corn and wheat beaten down by rain and wind. Lightning struck Hagerstown FM radio station transmitter, disabling it 4 hours.
Uniontown, Pa.	29	5:20 p. m.				do.	Wind broke trees and utility lines; damaged roofs; and broke windows.
Derry, Pa.	29					do.	Wind blew down trees and broke windows.
Conrad, Mont., near	30	2-2:15 p. m.	17			Hail	Path 25 miles long. Heavy hail severely damaged wheat and barley—approximately 24,000 acres—with about 30 to 40 percent damage to spring wheat and 90 to 100 percent damage to winter wheat. Spring wheat may make comeback.
Boise, Idaho	30	3 p. m.				Wind and rain	Some damage to trees; temporary disruption of power lines. 1 dwelling damaged by falling trees.
Orlando, Fla.	30	4:55 p. m.		0	0	Tornado	Funnel cloud observed about 10 miles northwest of Orlando; dipped to between 500 and 1,000 feet off ground; moved northward and apparently dissipated in about 10 minutes.
Forsyth, Mont., near	30	6-6:20 p. m.	12		5,000	Hail	Moderate to heavy hail severely damaged small grains over 12 mile path.
Great Falls, Mont.	30	6 p. m.			2,000	do.	Light hail damaged gardens and wheat in small rural areas.
Winifred, Mont.	30	6-6:30 p. m.	1		7,000	do.	Heavy hail considerably damaged wheat and barley.
Fort Benton, Mont., near	30	Evening				do.	Moderate hail considerably damaged winter wheat.
Brady and Valier, Mont.	30					do.	Loss to wheat.

¹ Miles instead of yards.

LATE STORM REPORTS FOR MAY 1948

[The table hereunder contains such data as were received concerning severe local storms that occurred during the month. A revised list will appear in the United States Meteorological Yearbook]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Plainview, La.	May 4	Early a. m.	200	0	\$15,000	Tornado	Destroyed schoolhouse, unroofed several homes. No injuries.
Winnfield, La.	5	11 p. m.				Wind and hail	Wind estimated at 50 m. p. h. accompanied hailstorm. Shrubbery and vegetables damaged.
St. Joseph, La., near	6	1 a. m.			10,000	Wind	Damaged roofs of homes and destroyed several cabins; destroyed hangar and private plane.
Angola, La.	6	Early a. m.	1		10,000	Wind and hail	Path 5 miles long. Damaged farm buildings, prison guard posts, and garages; only slight damage from hail.
Clay County, Iowa	15	10 p. m.	440	0	1,500	Small tornado	1 person injured by flying debris at Gillett Grove. Few buildings demolished and several parked automobiles damaged.

¹ Miles instead of yards.

SOLAR RADIATION DATA FOR JUNE 1948

[Solar Radiation Investigation Section, I. F. HAND in Charge]

Explanation of Tables 1 and 2 and references to descriptions of instruments, stations, and methods of observation, and to summaries of data, are given in the MONTHLY WEATHER REVIEW, vol. 72, No. 1, January 1944, p. 43. A list of pyrheliometric stations is given on page 45 of that issue. An explanation of the formula used in computing the air mass values for each station listed in Table 1 appears in vol. 75, No. 3, March 1947, p. 47.

TABLE 1.—Solar radiation intensities during June 1948

(Gram calories per minute per square centimeter of normal surface)

Date	Sun's zenith distance								Vapor pressure		
	A. M.				0.0°	P. M.				7:30 a. m. ¹	1:30 p. m. ¹
	78.7°	75.7°	70.7°	60.0°		60.0°	70.7°	75.7°	78.7°		
MADISON, WIS.											
	Air mass										
	4.81	3.84	2.88	1.92	*0.96	1.92	2.88	3.84	4.81		
June	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mb.	mb.
1	0.42	0.58	0.66	0.99	1.14					12.7	9.8
2	.57	.68	.80	.99	1.24	0.96				14.2	13.2
3				.83	1.08					16.5	14.8
4	.42	.55	.68	.84	1.09					15.3	15.3
7				.96	1.25					14.2	11.4
8	.69	.81	.96							12.3	12.7
9	.40	.50	.66	.84	1.03					12.7	12.3
11	.40	.48	.61	.87	1.34					17.0	12.3
16					1.17					9.4	10.2
24			.91	1.08	1.30	.98	0.77			17.7	17.0
25	.28	.33	.41	.50	.83					16.5	19.0
26			.74							15.3	21.8
29				.87						19.6	16.7
30	.75	.81	.98	1.16	1.36					13.2	13.2
Means	.40	.59	.74	.90	1.17	(.97)	(.77)				
Departures	-.15	-.18	-.16	-.14	-.16	.00	.00				
LINCOLN, NEBR.											
	Air mass										
	4.77	3.81	2.86	1.91	*0.95	1.91	2.86	3.81	4.77		
June	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mb.	mb.
4					1.20	1.06	0.92	0.82		16.9	19.6
8					1.40					15.3	11.0
9					1.27	1.03	.77			12.3	11.8
29					1.34	1.08	.86	.67	0.54	17.7	16.4
Means					1.30	1.06	.85	(.74)	(.54)		
Departures					-.05	-.03	-.05	-.04	-.12		

See footnotes at end of table.

Date	Sun's zenith distance								Vapor pressure		
	A. M.				0.0°	P. M.				7:30 a.m.	1:30 p.m.
	78.7°	75.7°	70.7°	60.0°		60.0°	70.7°	75.7°	78.7°		

CLIMAX, COLO.

		Air mass										
		3. 24	2. 59	1. 94	1. 29	*0. 65	1. 29	1. 94	2. 59	3. 24		
June		cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mb.	mb.
2			1. 07	1. 21	1. 34							
3			1. 06				1. 15	1. 04	0. 96			
4					1. 36	1. 51						
6					1. 40	1. 51						
10				1. 16	1. 30							
30				1. 24	1. 39							
Means			(1. 06)	1. 20	1. 36	(1. 51)		(1. 15)	(1. 04)	(. 96)		
Departures			-. 01	-. 03	-. 01	-. 02		-. 08	-. 07	-. 09		

TABLE MOUNTAIN, CALIF.

Air mass										
	3.76	3.01	2.26	1.51	*0.75	1.51	2.26	3.01	3.76	
June	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mb.
3				1.31						
5				1.38						
6				1.43						
8				1.35						
11				1.41						
12				1.38						
13				1.41						
14				1.42						
15				1.40						
17				1.43						
21				1.37						
22				1.37						
23				1.34						
Means				1.38						
Departures				+ .02						

BLUE HILL, MASS.

		Air mass										
		4.86	3.89	2.92	1.94	*0.97	1.94	2.92	3.89	4.86		
June		cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mb.	mb.
4							1.11	0.94			11.5	11.5
6		0.90	1.00	1.13	1.28	1.49					6.6	7.4
14						1.44		.86			14.0	14.2
17		.62	.74	.91	1.15						11.9	9.1
18		.79	.92	1.05	1.20	1.38					12.1	9.3
20					1.16		1.20				12.5	8.6
21		.37	.44	.56	.74						12.2	11.1
22		.81									12.0	12.4
25					1.00		1.01	.82	0.67	0.55	23.2	19.0
26		.47	.59	.78			1.10	.96	.85	.73	15.5	13.7
30							.68	.44			26.3	27.8
Means		.66	.74	.89	1.09	1.44	1.02	.80	(.76)	(.64)		
Departures		+ .01	-.01	.00	+ .05	+ .13	-.02	-.04	+ .08	+ .08		

*Extrapolated.

¹ 75th Meridian time.

TABLE 2.—Daily totals and weekly means of solar radiation (direct+diffuse) received on a horizontal surface

(Gram calories per square centimeter)

Date	Washington, D. C.	Madison, Ws.	Lincoln, Nebr.	New York, N. Y.	Fresno, Calif.	Fairbanks, Alaska	Columbia, Mo.	Boston, Mass.	Nashville, Tenn.	Twin Falls, Idaho	La Jolla, Calif.	Riverside, Calif.	Blue Hill, Mass.	Newport, R. I.	Salt Lake City, Utah	Put-in-Bay, Ohio	State College, Pa.	Davis, Calif.	Toronto, Canada	Ithaca, N. Y.	Boulder, Colo.	East Wareham, Mass.	Honolulu, T. H.	Pearl Harbor, T. H.	East Lansing, Mich.	Summit, Mont.	Soda Springs, Calif.	Grand Lake, Colo.
1948	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
June 3.....	232	695	712	368	748	661	743	528	518	461	563	676	547	442	538	563	521	380	545	446	644	450	738	705	548	99	584	838
June 4.....	624	548	724	398	793	458	714	501	509	521	281	516	578	595	662	644	561	418	389	428	718	505	703	661	546	164	322	822
June 5.....	353	214	275	226	626	616	620	102	484	574	705	766	105	116	738	782	414	495	762	386	726	110	683	626	667	501	321	845
June 6.....	698	217	696	674	782	345	307	739	360	691	570	644	772	804	752	223	655	548	552	464	688	733	715	469	324	777	748	748
June 7.....	503	599	711	206	722	248	722	92	537	408	606	578	86	154	264	284	225	557	223	53	548	160	581	479	283	747	571	552
June 8.....	665	354	782	865	752	396	811	92	471	695	554	734	150	411	716	195	527	705	555	336	673	254	427	422	134	718	676	651
June 9.....	472	670	739	70	700	680	782	97	634	559	713	742	100	166	653	534	350	691	564	109	536	183	570	488	466	189	673	600
Means.....	507	479	666	358	732	486	671	307	502	558	570	666	334	384	617	461	465	542	513	317	648	342	640	550	424	469	557	722
Departures.....	-7	-29	+150	-128	+52	-20	+115	-131	-49	-14	+34	+117	-175	-180	+87	-75	-32	-106	+12	-171	+88	-145	+9	-28	-16	.....	.....	.....
June 10.....	635	623	659	204	730	444	780	183	592	523	604	682	222	161	542	552	633	614	456	433	451	276	612	544	552	228	358	738
June 11.....	569	678	656	454	780	419	743	313	588	532	604	762	374	407	735	308	478	746	585	263	283	397	701	572	232	66	729	375
June 12.....	456	224	293	446	772	657	430	182	576	634	575	729	169	261	754	303	426	641	394	375	541	213	539	497	113	544	376	683
June 13.....	352	778	771	125	811	453	760	51	555	702	512	725	74	81	727	716	510	757	712	414	748	74	631	624	542	358	864	762
June 14.....	672	493	522	522	805	416	578	637	446	384	644	760	687	741	674	559	675	746	541	458	533	636	708	595	376	544	833	778
June 15.....	633	666	589	312	818	665	262	396	482	547	674	742	443	351	711	613	497	742	663	325	650	312	728	695	482	261	586	809
June 16.....	126	729	609	152	808	693	590	438	379	641	638	735	526	410	690	745	502	737	624	460	612	479	731	692	649	124	832	842
Means.....	492	599	585	316	789	535	589	314	517	566	607	733	356	345	691	542	532	712	574	390	545	341	664	603	421	303	696	712
Departures.....	-11	+101	+45	-160	+85	+22	+29	-132	-11	-42	+72	+140	-129	-152	+119	+5	-28	-17	+48	-86	+26	-153	+22	+21	-9	.....	.....	.....
June 17.....	756	263	394	697	809	662	236	589	496	680	641	728	646	697	681	678	665	732	620	398	748	633	678	646	560	282	822	846
June 18.....	358	208	621	408	821	636	485	595	190	353	617	729	687	775	448	400	469	765	481	409	168	721	716	693	294	204	804	829
June 19.....	466	351	650	264	794	126	735	74	514	635	667	674	93	168	310	475	270	739	455	402	171	143	670	646	68	452	800	443
June 20.....	280	476	136	661	775	187	351	662	441	366	526	666	707	732	409	754	709	482	695	507	409	661	719	556	600	607	154	560
June 21.....	647	263	322	469	797	293	.....	571	446	341	311	628	694	681	153	253	504	784	352	330	343	625	742	695	180	375	868	395
June 22.....	435	461	300	95	814	493	.....	508	469	329	473	496	494	472	314	567	199	770	109	86	360	463	745	705	259	446	859	251
June 23.....	430	581	725	64	793	542	.....	95	641	731	336	529	144	144	404	681	336	743	540	255	168	171	680	721	428	424	819	277
Means.....	482	372	450	380	800	420	452	442	485	491	510	636	495	524	388	544	450	717	465	341	351	488	707	666	341	398	732	514
Departures.....	-21	-161	-118	-105	+82	-112	-110	+6	-59	-163	-50	+34	-40	-20	-176	-39	-81	+11	-63	-140	-165	-3	+61	+83	-162	.....	.....	.....
June 24.....	610	672	632	505	775	561	.....	445	458	718	355	638	480	432	630	367	490	721	255	304	562	374	681	610	345	242	797	470
June 25.....	693	549	699	663	781	611	.....	596	522	656	310	565	726	727	647	699	479	705	506	338	394	681	739	707	567	442	794	447
June 26.....	461	461	500	483	763	399	.....	565	486	633	204	542	662	568	468	322	319	713	619	332	436	669	654	691	465	799	795	350
June 27.....	626	481	468	137	759	115	.....	264	507	702	460	624	299	214	650	398	545	697	212	182	275	219	747	399	219	484	802	263
June 28.....	661	356	428	349	747	113	.....	457	417	703	258	674	552	509	721	639	554	690	335	347	560	478	593	405	410	643	727	405
June 29.....	646	475	616	551	732	150	.....	484	568	694	218	657	537	658	726	483	649	699	463	369	565	602	388	356	189	780	811	703
June 30.....	577	760	745	620	706	344	.....	568	599	402	356	671	642	643	635	596	439	706	512	322	657	614	663	619	526	660	740	820
July 1.....	458	670	.....	574	.....	698	.....	271	726	412	359	678	238	330	.....	628	713	737	519	419	342	233	581	506	663	562	797	703
Means.....	592	553	584	485	752	370	.....	456	535	615	315	631	516	510	640	509	524	708	426	327	474	484	631	533	423	576	783	520
Departures.....	+61	+7	-8	+1	+43	-89	.....	-10	-2	-16	-203	+35	-8	-37	-22	-77	-2	-18	-93	-144	-87	-15	+7	-31	-73	.....	.....	.....

ACCUMULATED DEPARTURES ON JULY 1, 1948

-	+	+	-	+	{	-	+	-	-	+	-	-	+	-	-	+	-	+	-	-	-	-	-	-	{	+	{	-
2324	2723	3717	7119	7364	.....	{	3257	910	2800	980	7721	6090	4543	1113	4333	3493	3703	2191	12320	175	4592	.....	.....	.....	.....	.....	{	1575	.....	{	2646	.....

TABLE 3.—Daily totals and weekly means of solar and sky radiation plus the radiation reflected from the ground, as received on a vertical surface facing south at Blue Hill, Mass., during June 1948

VERTICAL SURFACE MEASUREMENTS FOR BLUE HILL, MASS., FOR JUNE, 1948

Date.....	3	4	5	6	7	8	9	Mean	10	11	12	13	14	15	16	Mean	17
Gm. cal/cm ²	255	254	52	270	43	90	56	146	111	186	88	40	254	202	215	157	238
Date.....	18	19	20	21	22	23	Mean	24	25	26	27	28	29	30	1	Mean	210
Gm. cal/cm ²	251	51	255	264	226	67	193	214	258	252	139	237	230	230	118	.....	.....

Chart I. Departure ($^{\circ}\text{F.}$) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, June 1948

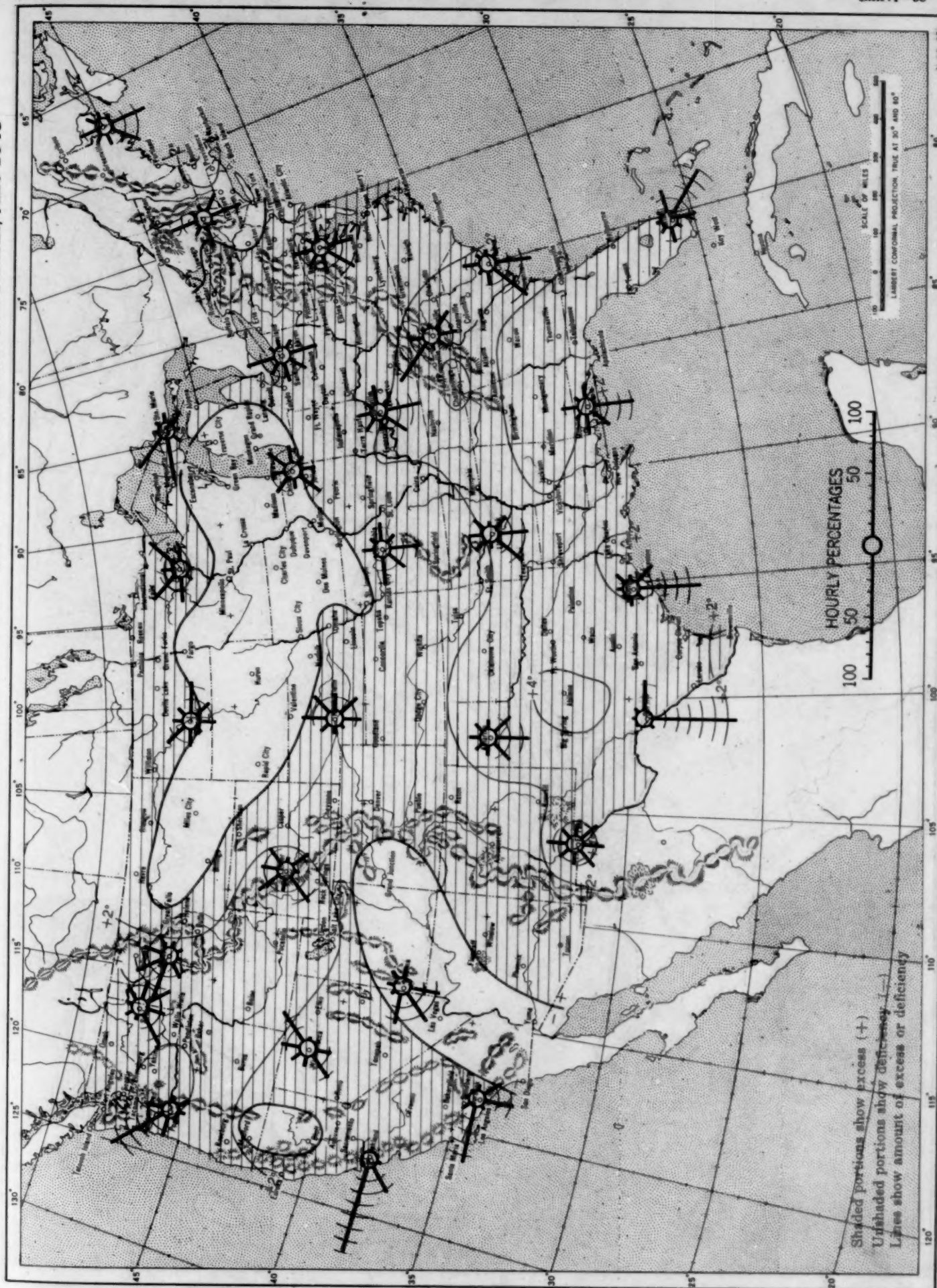


Chart II. Tracks of Centers of Anticyclones, June 1948. (Inset) Departure of Monthly Mean Pressure from Normal

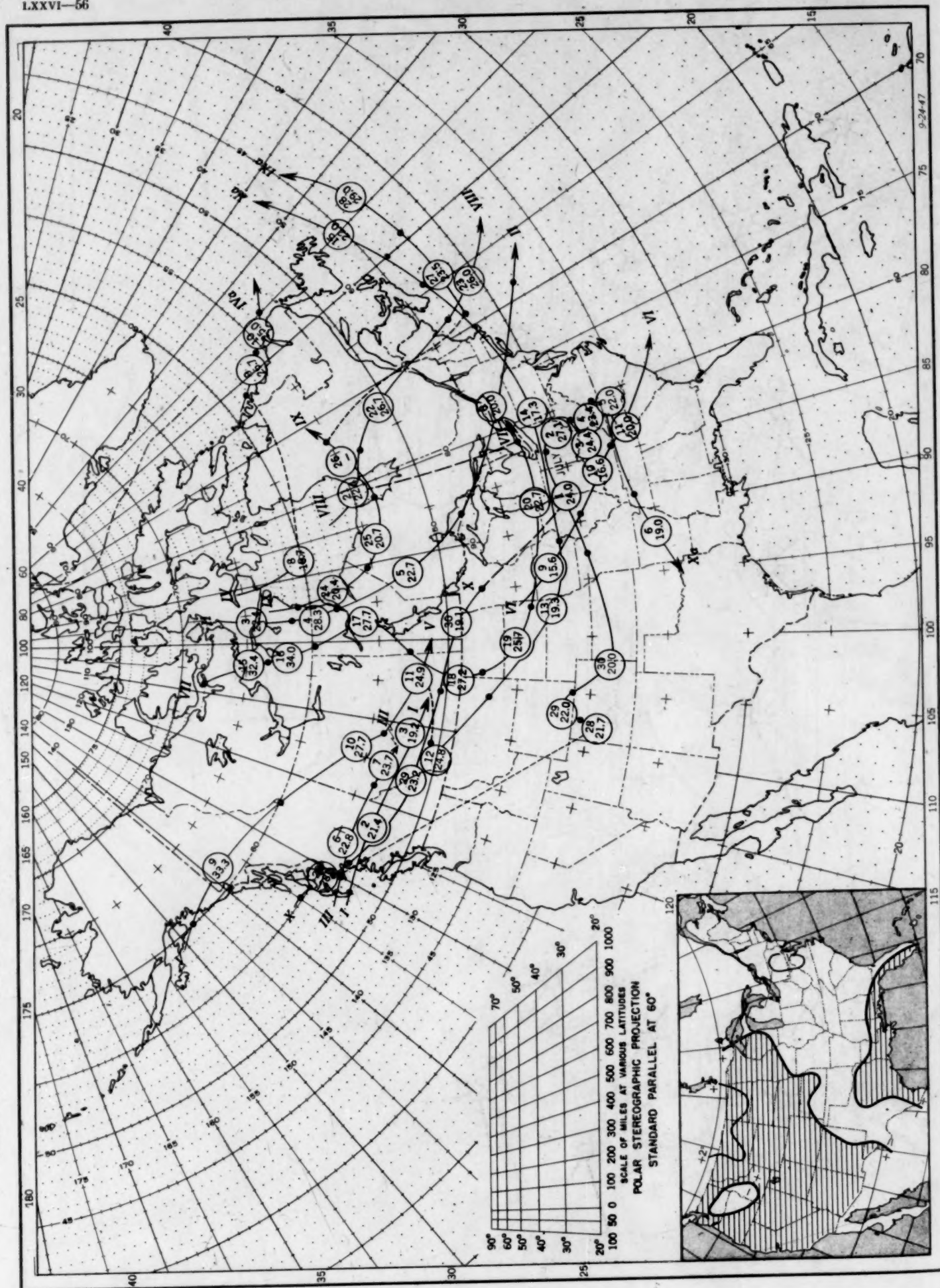


Chart III. Tracks of Centers of Cyclones, June 1948. (Inset) Change in Mean Pressure from Preceding Month

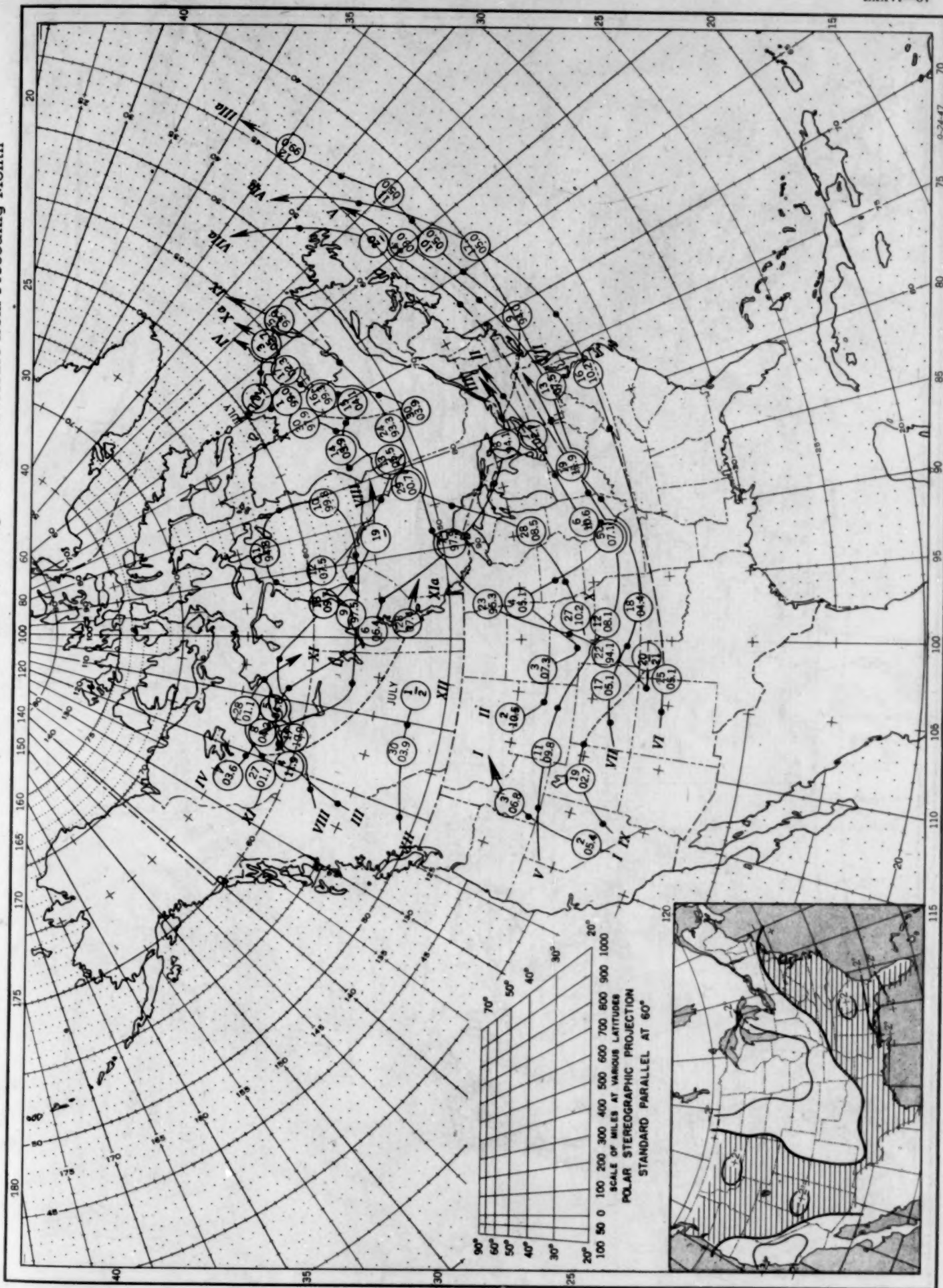


Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, June 1948

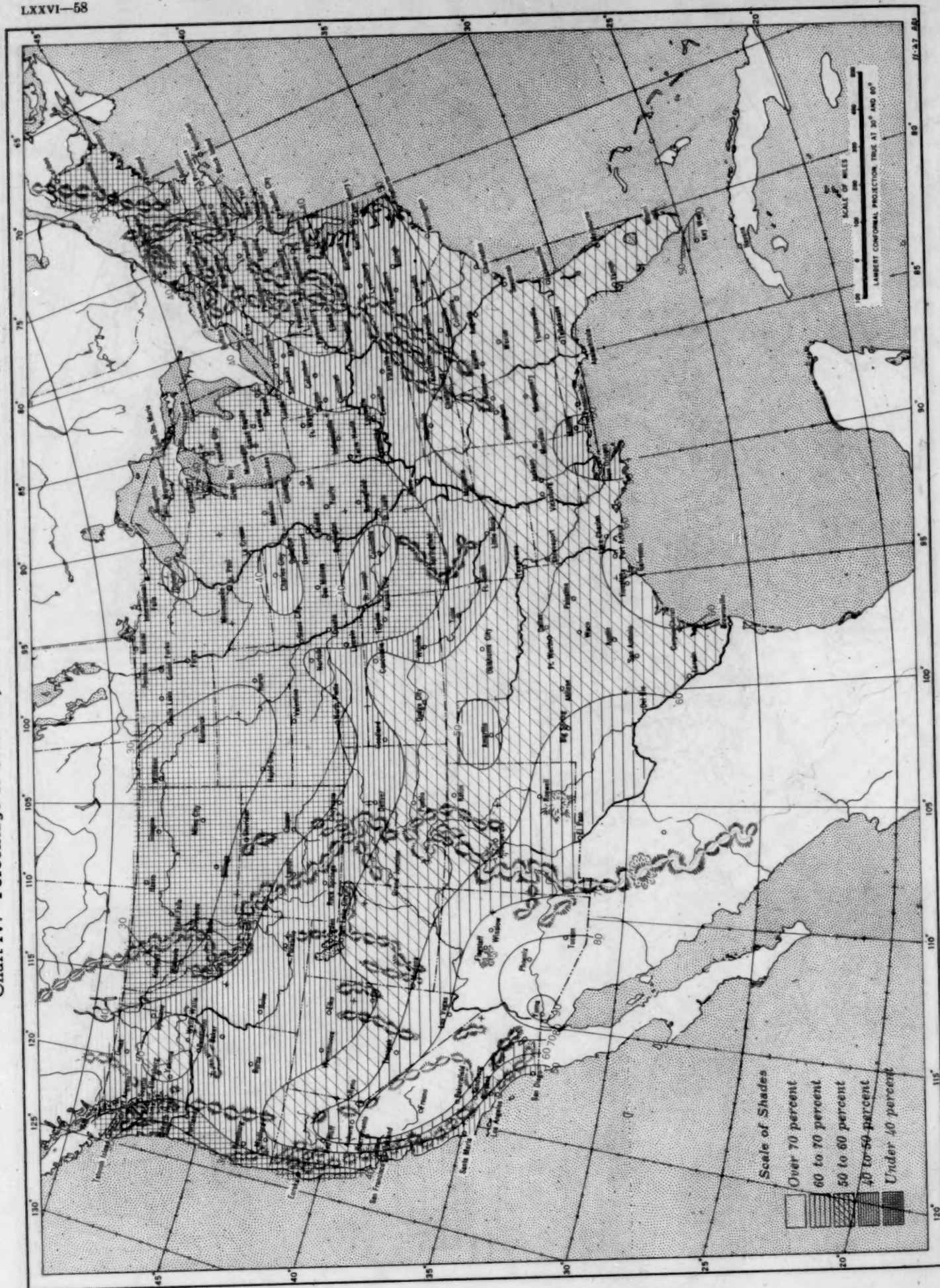


Chart V. Total Precipitation, Inches, June 1948. (Inset) Departure of Precipitation from Normal



Chart VI. Isobars (mb.) at Sea Level and Isotherms ($^{\circ}\text{F.}$) at Surface; Prevailing Winds, June 1948

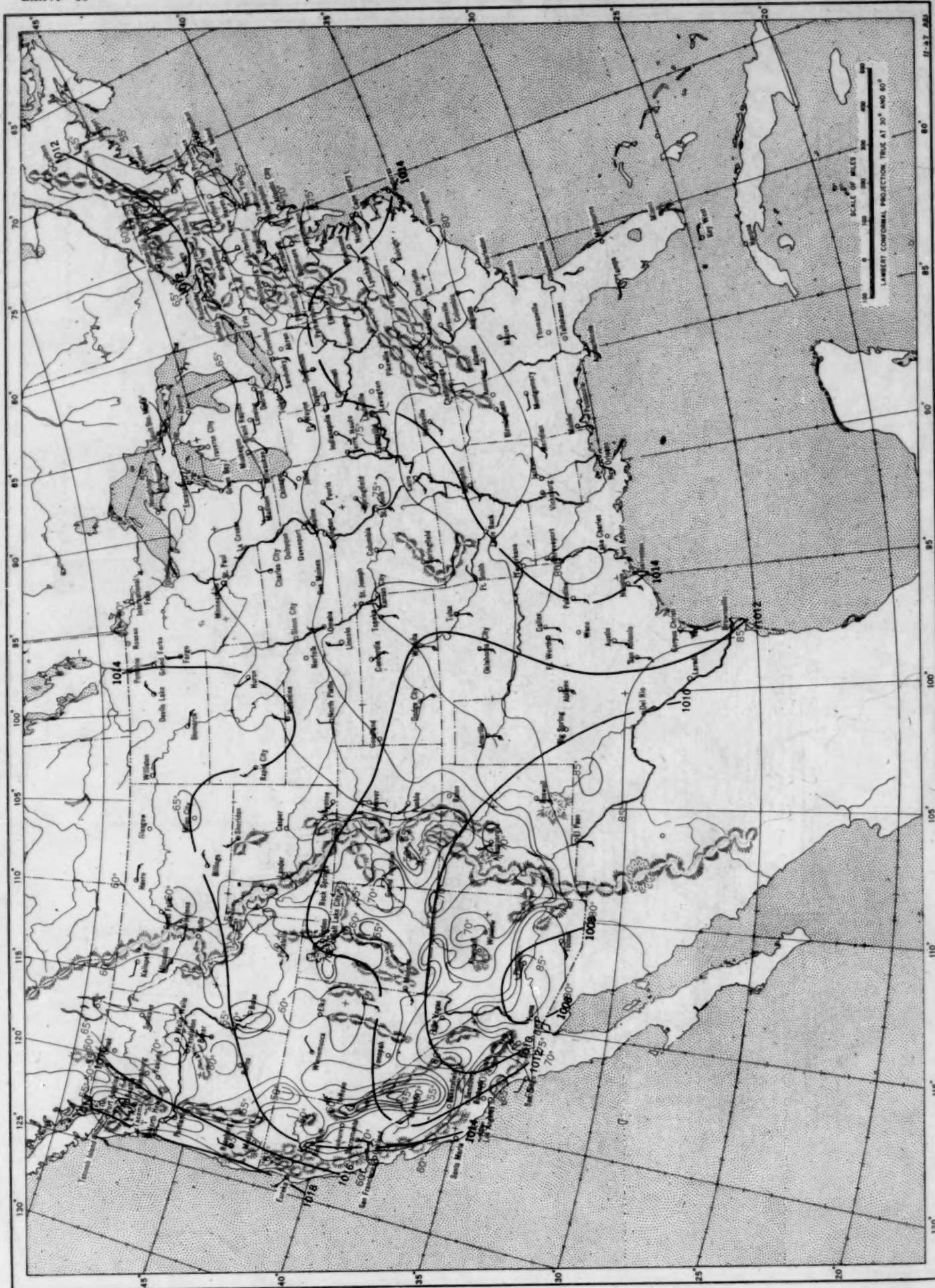
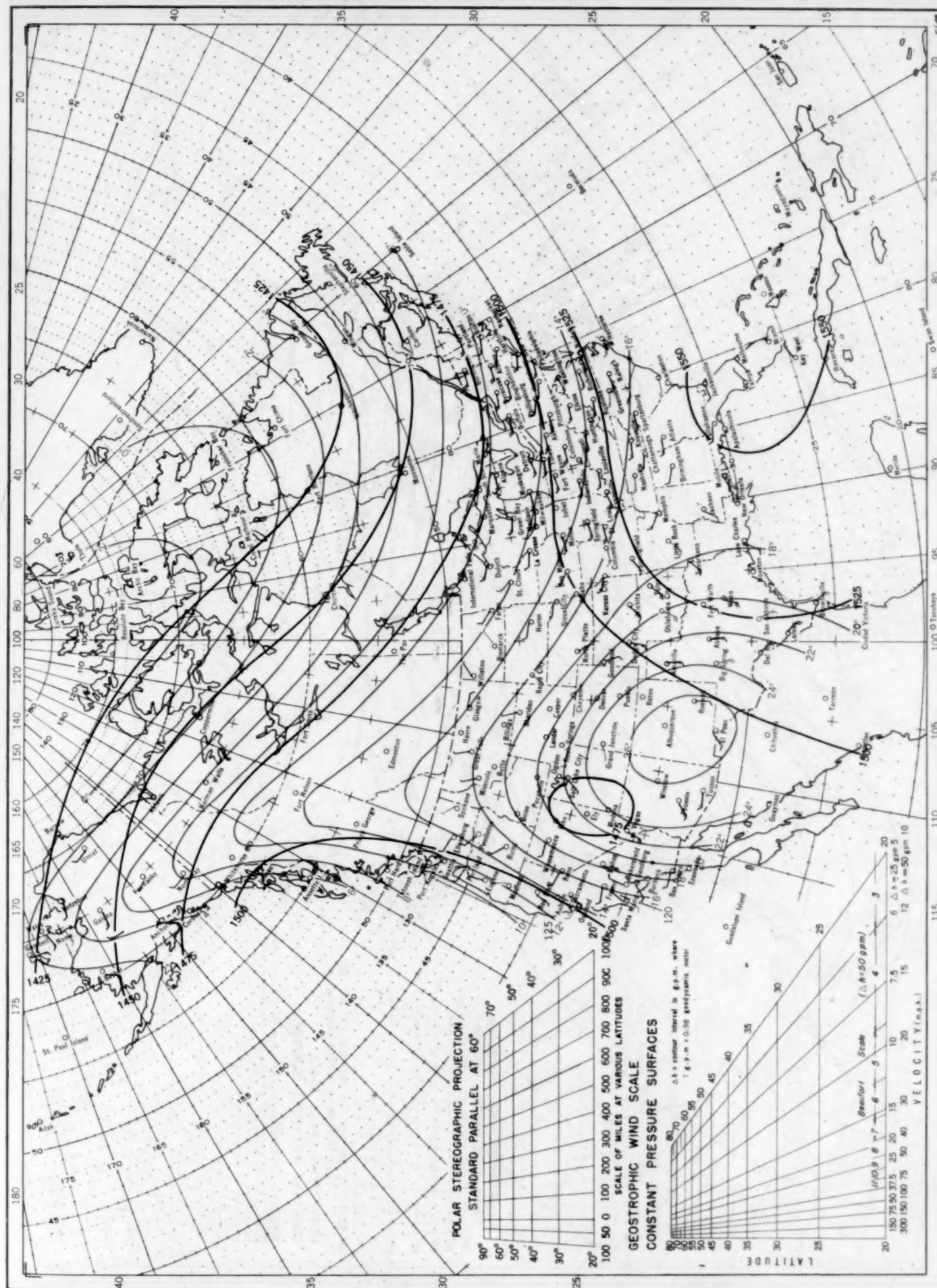
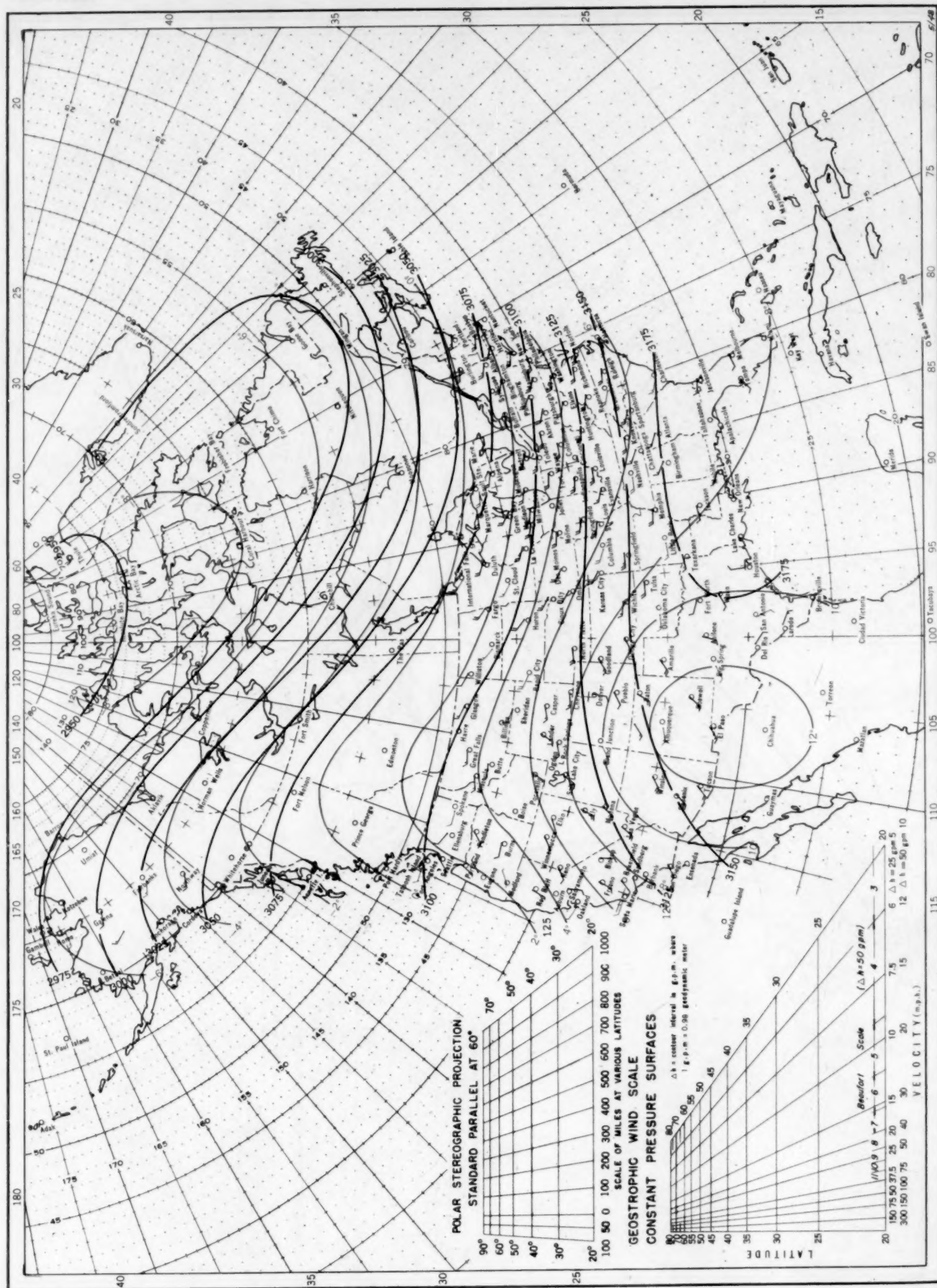


Chart VIII, June 1948. Contour Lines of Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Isotherms in Degrees Centigrade for the 850-millibar Pressure Surface, and Resultant Winds at 1,500 Meters (m. s. l.)



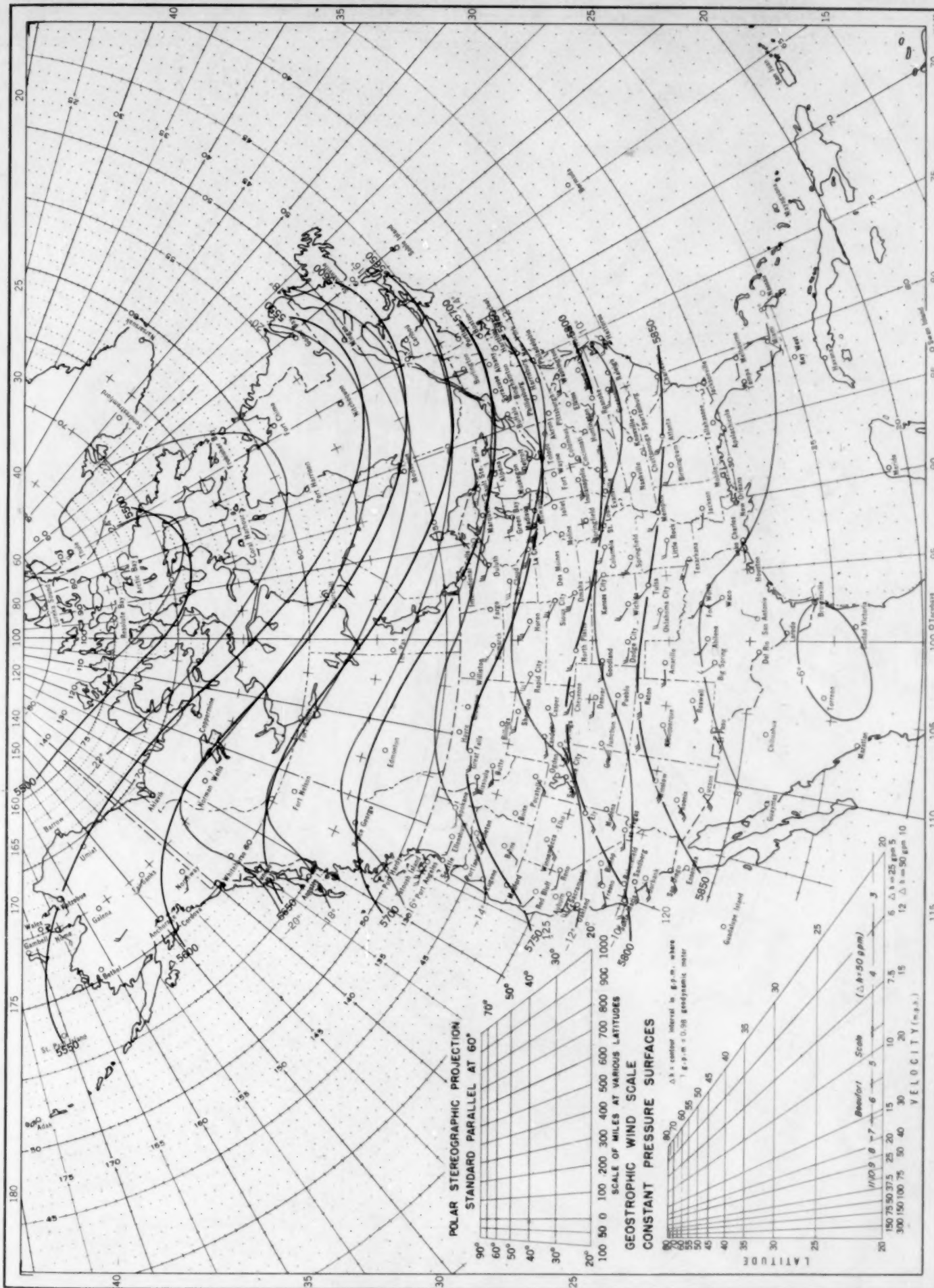
Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2200 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

Chart IX, June 1948. Contour Lines of Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Isotherms in Degrees Centigrade for the 700-millibar Pressure Surface, and Resultant Winds at 3,000 Meters (m. s.l.)



Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2200 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

Chart X, June 1948. Contour Lines of Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Isotherms in Degrees Centigrade for the 500-millibar Pressure Surface, and Resultant Winds at 5,000 Meters (m. s. l.)



Contour lines and isotherms based on radiosonde observations at 0800 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2200 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

Chart XI, June 1948. Contour Lines of Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Isotherms in Degrees Centigrade for the 300-millibar Pressure Surface, and Resultant Winds at 10,000 Meters (m. s. l.)

